INCREASING UNIT EFFECTIVENESS IN A DYNAMIC ENVIRONMENT BY IMPLEMENTING A LEADERSHIP MATHEMATICAL MODEL

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The Ukrainian Army is in a transition period which requires flexible, adaptive leadership with a contemporary vision. The problem of improving unit effectiveness is now very topical, because old leadership does not correspond to modern requirements and does not facilitate rapid development. The lack of understanding the need for a change in a dynamic environment makes a military unit ineffective. To explain the procedure of how to lead subordinates in a dynamic environment and give recommendations for commanders is valuable, because it will adapt the current leadership for modern requirements and make a military unit effective in any operational environment. The purpose of this research is to find an improved leadership model that will significantly increase unit effectiveness in a dynamic environment. This is a model that could be used as the foundation for a change in the leadership culture of the Ukrainian Army. The originality of this work will be its use of mathematical formulas to explain the key leadership methods/ideas proposed within the study.

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The opinions and conclusions expressed herein are those of the student author and do not necessarily represent the views of the U.S. Army Command and General Staff College or any other governmental agency. (References to this study should include the foregoing statement.)

ABSTRACT

INCREASING UNIT EFFECTIVENESS IN A DYNAMIC ENVIRONMENT BY IMPLEMENTING A LEADERSHIP MATHEMATICAL MODEL, by LTC Yuriy V. Naplyokov, 133 pages.

The Ukrainian Army is in a transition period which requires flexible, adaptive leadership with a contemporary vision. The problem of improving unit effectiveness is now very topical, because old leadership does not correspond to modern requirements and does not facilitate rapid development. The lack of understanding the need for a change in a dynamic environment makes a military unit ineffective. To explain the procedure of how to lead subordinates in a dynamic environment and give recommendations for commanders is valuable, because it will adapt the current leadership for modern requirements and make a military unit effective in any operational environment. The purpose of this research is to find an improved leadership model that will significantly increase unit effectiveness in a dynamic environment. This is a model that could be used as the foundation for a change in the leadership culture of the Ukrainian Army. The originality of this work will be its use of mathematical formulas to explain the key leadership methods/ideas proposed within the study.

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ACRONYMS

Blp	Boundary of losing power
Boe	Boundary of explosion
C	Commander
Cfl	Coefficient of personal flexibility
CISS	Campbell Interest and Skill Survey
Cps	Coefficient of personal stability
CSEM	Commander, subordinates, environment, and mission
Csu	Coefficient of unit stability
DE	Dynamic environment
EI	Emotional intelligence
Ei	Unit effectiveness for day —ž
Fc	Frequency of fluctuation of a commander‘s behavior
Fs	Frequency of fluctuation of a human system
f(x)	Function of behavior of unit effectiveness (commander‘s behavior)
f(y)	Function of unit (system) behavior
Ir	Influence of environment
IQ	Intelligence quotient (assesses intelligence)
Lef	Level of unit effectiveness
Lei	Level of emotional intelligence
Lstr	Current level of stress
Lstro	Maximum level of stress which can endure the human system
MBTI	Myers-Briggs Type Indicator
MRAP	Mine resistant ambush protected vehicle

NCO	Army rank of non-commissioned officer
R	Resilience
Rstr	Resilience of a system that corresponds to Lstr
Rstro	Maximum personal resilience when a human system is still stable
S	Subordinate
SA	Situational awareness
Sen	Sensitivity
SU	Situational understanding

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CHAPTER 1

INTRODUCTION

Background

The purpose of this study is to find a method of leading subordinates in a dynamic environment (DE) in order to maintain or increase effectiveness of a military unit. The topic of this study is leadership in a DE and unit effectiveness.

Unit effectiveness can be defined by its level of leadership, weapons, skills, abilities, experience of subordinates, unit structure, operational and tactical art, and overall conditions in the unit. A DE is a situation which is always changing over time. This is a typical environment for a military unit.

Leadership is vital in order to make a military unit effective. For example, if no coordination and mutual understanding between the commander and the subordinates existed, weapons could not play a big role, because the bullets would go to the wrong targets. So we can assume that effectiveness of leadership defines unit effectiveness.

Leadership effectiveness can be defined as a variety of responses of human behavior to the achievement of organizational goals. The task of the leader is to accomplish a mission or reach the organizational goals with the best result by influencing the behavior of subordinates and influencing the situation by means of leadership.

To improve leadership effectiveness is one of the ways to increase unit effectiveness without requiring additional economic resources in comparison with other factors which influence unit combat readiness. Thus, to look for an improved method to lead a military unit is a valuable task that merits further research.

This research will focus on leading subordinates in a DE. An improved method to lead subordinates could facilitate effective mission accomplishment and increase unit effectiveness. The U.S. Army uses mission command as the method for command and control in fluid military operations. –Successful mission command results from subordinate leaders at all echelons exercising disciplined initiative within the commander‘s intent to accomplish missions. It requires an environment of trust and mutual understanding” (Headquarters, Department of the Army 2003, 1-17).

The research problem arises from a military culture with inflexible military regulations that do not allow a commander to use a modern tempo of development. The transition of a military unit from one point to another is a complicated process with high resistance to change. As a result of this, a military unit is often not effective. A commander with a flexible and adaptive leadership method can increase unit effectiveness.

Most military systems are not flexible because of the way they are designed. It requires centralized command, strict rules and fewer innovations. A military unit is an inert organization. A commander does not have enough opportunities to adapt a military unit quickly under the influence of the environment which includes industrial, social, and political development. A military unit can became ineffective under conditions of a DE. To save the effectiveness of a military unit or increase it, a commander has to make changes in a unit as quickly as possible. An improved method of leading subordinates can provide conditions for transition and adaptation of a military unit to new requirements.

Humanity‘s high cognitive level has moved ahead with an endless development process of technologies and innovations. The human mind changes much faster than

human behavior, especially in a military system, because it is a more closed system than those of civilian organizations. A government supplies all the needs of a military unit, and a commander does not have to worry about supplies and salaries for subordinates. On the contrary, a civilian organization has to survive and adapt to situations as quickly as possible. A military unit has to maintain a required level of combat readiness but without the ability for adaptation it will not be able to accomplish a mission successfully. So unit adaptability becomes a topical problem under conditions of a DE.

First of all, for many commanders change is a philosophical problem. Also, traditional military culture does not allow creating new policies in the relationship between a commander and subordinates. To imagine subordinates who have equal rights with commanders is not easy. But very often a real situation requires them to be closer to each other. Commanders and subordinates are parts of one system that cannot work effectively if their relationships are broken. A solution to this problem has to be a qualitatively new kind of freedom with defined responsibility for everyone in a military unit. This type of thinking for a commander and subordinates will make a military unit more survivable and effective in a modern DE.

Second, technically a commander has to have a method of leading subordinates effectively. The method should have the main characteristics of flexibility, versatility and adaptability. To find the method might allow achieving effective leadership and making military regulations more flexible.

The problem of adaptation to modern requirements is relevant to the Ukrainian Army. The current transition from the Army‘s old model to a new one does not allow achieving the desired unit effectiveness. Moreover, the current leadership and culture

inhibit the skills and abilities of military personnel. A lot of talented officers and NCOs cannot maximize their potential and opportunities because of the old and inflexible system of leadership and management in the Ukrainian Army and decide to retire from the military.

The right leadership may allow accomplishing a mission with the best results in peace time and in crisis situations as well. The role of the leader in this case is enormous. A commander‘s vision, ability to communicate, and flexibility will keep a military unit in a stable state and allow accomplishing a mission with maximum effectiveness.

Environment influences a military unit which is an organized system with its own characteristics such as an organizational culture and climate. Organizational culture, climate of a military unit and environment make up a triangle that a commander has to manage and implement the right leadership tools at the right time in order to achieve desired goals with maximum effectiveness.

A DE requires monitoring the situation and modifying a military unit before it is changed by its environment. A military unit, like a human system, has inertia, so its immediate reaction is impossible and takes time. Therefore, the commander‘s vision with a plan of execution has to determine a way to achieve the desired end state of a military unit.

Understanding a person‘s resilience as a reaction to environmental influence could help to implement changes quickly and realize the commander‘s vision. Resilience of a person or a military unit can help to define leadership in a DE and facilitate finding a method of leading subordinates during a transition period.

During a transition period a military unit (a system) becomes open, sensitive and vulnerable. The transition period may be short or long and have different sequences. A commander has to provide conditions for successful transition. The commander‘s role is to build a safe bridge from one stable state of a system to another. In spite of the reality that the system is very dynamic during the transition period a commander has to keep the system balanced and stable. Providing flexibility, versatility and adaptability in a military unit by means of leadership may be a method to maintain the military unit as a balanced stable system.

The leadership model can be built on the idea that every system has to be stable. This condition makes a system (a military unit) effective and creates a self-regulated leadership model (a learning organization). Every mistake can be automatically directed through the chain of communication and other commander‘s activities in order to keep the system stable. The satisfaction and independence of subordinates will play an important role.

This research will focus on the placement of personnel which may increase their satisfaction and level of independence. Subordinates have to have the opportunity to change job positions within a military unit. The idea is to assign job positions where subordinates may realize their natural abilities and skills effectively.

Leadership theories work in a stable environment which includes a commander, subordinates, and a situation without any changes. We can take in account more stable periods of time and evaluate leading a military unit according to leadership theories, but in reality all three subjects are changeable. For instance, subordinates may change because of new recruits arriving, improvement of their skills, increased experience, their

mood, and their health. Thus a previous leadership style may not be appropriate for a new situation.

Flexible leadership can maintain unit effectiveness. A commander can influence the behavior of subordinates and also change himself. This will help to keep a military unit in equilibrium with a DE. Lack of ability to adapt makes a military unit less effective and may not allow it to accomplishing its mission. If this happens, a system has spent a lot of effort for protection and unit effectiveness is decreased. A military unit encounters problems and loses effectiveness sharply when a commander does not react in time to make changes. A commander has to adapt a military unit and provide it equilibrium with a DE by means of leadership. Communication and feedback will guide a commander with these changes.

Leadership can make a military unit (a system) stable by bringing about equilibrium with a DE. We can suppose that a time line has endless amounts of points where a system has a stable state. The purpose is to keep a system stable or in equilibrium with the environment at every point, because only a stable system can work effectively. Moreover, a state of equilibrium of a military unit with a DE can provide favorable conditions during a period of transition when a system usually is open and not stable. The leadership model will help to build a military unit with principles of a learning organization. In an organization with self regulation a mistake can be automatically directed through the chain of communication and other commander‘s activities in order to keep the organization in a stable state.

The primary and secondary research questions

The primary question of this thesis is:

How is it possible to increase unit effectiveness by means of leadership?

The secondary questions include:

1. How flexible, adaptable, and versatile must the leader be in the process of change?
2. What is the method of leading subordinates in a DE?
3. What is the procedure to implement the method of leading subordinates in a DE?
4. What is the method to assign the right job to the right person?

The first secondary research question encompasses analyzing a human organizational system in a DE. Leadership in a DE requires flexibility, versatility and adaptability. A commander‘s ability to use a wide variety of leadership tools and flexibility makes his leadership more effective. Description of a leader‘s and subordinates‘ reaction helps to understand the process of leading subordinates in a DE. Establishment of personal and the unit‘s characteristics facilitates the research.

The second research question involves defining and proving the method of leading subordinates in a DE on the basis of the analysis above.

The third research question answers how to implement the improved method of leading subordinates in a DE by focusing on communication, a leader‘s power and leadership styles, and the use of vision to change a unit‘s structure. This question also encompasses the problem of personal resilience, which is important in the process of change.

A military unit is a model with four domains: a commander, subordinates, environment, and mission (CSEM). In reality, a military unit has limitations which a commander and subordinates cannot cross. Therefore, it is possible to envision a military unit as a box with definite boundaries. A commander and subordinates are inside of it. The environment influences the box and a commander has to lead subordinates inside the box by taking into account the subordinates, mission and a DE.

Different types of a commander‘s power play a significant role in order to obtain commitment and compliance of subordinates. A commander‘s power in a DE can produce both positive and negative results as well. A combination of the type and level of power can increase or decrease conflict within a military unit. Using the right power at the right time will increase unit effectiveness.

Leadership does not exist without communication. In a complicated four-dimensional system (CSEM) communication, like a liquid, will fill empty places and connect all in one unity to build stability which provides high unit effectiveness. Moreover, communication is essential to improve support for any change needed and plays a vital role during the transition period.

Both a person and a military unit have resilience which plays a key role during a transition period or during a moment of change. Understanding the nature, limitations and level of resilience is critical in order to successfully lead subordinates in a DE.

The process of organizational change is complicated and foremost of all requires the commander‘s vision and the building of a shared vision with subordinates. In real life the transition is endless, but with different speeds. The friction between the natural need of stability for every organization and the requirements for change creates a conflict. A

new environment can require changing unit structure. Keeping a military unit in dynamic equilibrium with its environment maintains its effectiveness.

The fourth research questions encompasses placement of personnel in order to effectively use subordinates‘ abilities and skills.

Assumptions

It is possible to assume that:

1. One person can lead others;

2. A military unit is a dynamic human system with four dimensions: commander, subordinates, environment and mission (CSEM);

3. People resist change;

4. A commander, subordinates, mission and the environment can change their characteristics over a period of time independently from each other;

5. Subordinates and a commander carry out their duties according to established regulations;

6. Members of a military unit can be motivated to do their job and get satisfaction from it;

7. Members of a military unit have opportunities based on their natural abilities and experience.

Scope and Delimitations

The scope of the research is a military unit with a size equal to a brigade (a battalion). Unit effectiveness can be increased through leadership under conditions when the military units being compared have the same technical equipment, amount of

personnel, skills and experience of the subordinates. This research will create a method of leading subordinates in current situations which can be used at the tactical and organization levels as well. The results of this study will be appropriate to use in both peacetime and combat situations.

Significance of the Study

The significance of this research will be to find an improved method of leading subordinates in a DE and make recommendations to commanders. This method will provide maximum effectiveness in accomplishing a mission and increase the readiness of a military unit without requiring additional economic resources in the transition period. This research will help to introduce the subject of leadership into the Ukrainian military education system and offer leadership in accordance with modern standards.

Summary

In conclusion, the method of leading subordinates in a DE can maintain and increase unit effectiveness. Moreover, it can help to create a correct vision for the commander and adapt a military unit to future challenges. To research the problem requires reviewing literature sources and analyzing information provided in chapter 2.

CHAPTER 2

LITERATURE REVIEW

The purpose of the study is to find an improved method of leading subordinates in a DE in order to maintain or increase unit effectiveness.

The thematic review of literature is the organizational principle for chapter 2. The literature review will be organized around the issue of the research. The data and analysis will follow with the main idea of the research. The primary, secondary and sub- questions define the direction of the thematic review of the literature.

Publications on the subject of the research describe civilian leadership very well but do not give precise recommendations for the military. According to the literature sources, leadership plays one of the primary roles in achieving an organization‘s success. Therefore, to adapt civilian innovations for military needs is valuable. The literature sources have a lack of information and do not show ways to increase unit effectiveness in a DE.

To accomplish a mission a commander has to achieve efficiency and effectiveness. Efficiency is ~~t~~he achievement of some output with minimum resource use. Effectiveness is simply the achievement of a goal, which is appropriate, regardless of the resource use” (Anthony1981, 5). So, effectiveness means that a commander has achieved the desired result. Efficiency means that the result has been achieved with minimum resource use. Both effectiveness and efficiency are important in this research. Thus, definitions of effectiveness and efficiency will help to analyze a military unit and compare it with another unit with a different method of leading subordinates.

The meaning and definition of leadership effectiveness is different in comparison with a definition of organizational effectiveness. Hughes, Ginnett, and Curphy define leadership effectiveness as ―judgments about the adequacy of behavior with respect to certain criteria such as work-group or organizational goals" (2006, 244). The overall effectiveness of a military unit has a strong connection with leadership effectiveness. This means that unit effectiveness could be improved by means of leadership.

Effective leadership requires keeping a balance. The literature describes the balance generally without a focus on the limitations of leadership. For instance, Fallon explains this balance as a certain kind of behavior between a leader and followers, where responsibilities are shared and group members take initiative, do not threaten the formal leader (1981, 208). This research will focus on the explanation of the critical boundaries within which to lead subordinates.

Anthony explains that ―there are two broad measures of effectiveness for leadership. First, an appropriate goal or set of goals will be achieved at least cost. Second, members of the group will be satisfied with their own and their leader's performance" (1981, 158).

The group of people can be effective or ineffective. Myers describes the characteristics of effective and ineffective groups (1981, 48-52).

A lot of ingredients can define unit effectiveness. For example, modern weapons, equipment, and communication systems can make a military unit effective. But this research will focus on leadership effectiveness which is a part of unit effectiveness. It is possible to compare military units under equal conditions. In this case, unit effectiveness

will depend on leadership. Thus leadership becomes the main tool that defines unit effectiveness.

—Mostresearchers evaluate leadership effectiveness in terms of the consequences of the leader's actions for followers and other organization stakeholders. . . . The attitude of followers toward the leader is another common indicator of leader effectiveness" (Yukl 2006, 9-10).

In spite of the definition of leadership effectiveness there is no simple recipe for effective leadership. The right behavior in one situation is not necessarily the right behavior in another situation (Hughes, Ginnett, and Curphy 2006, 43). A commander, subordinates, environment and mission (CSEM) are the main domains of leadership. Relationships between these four domains are complicated. They can influence each others in different ways. Moreover, the effect of leadership can have immediate and delayed outcomes. —Theimmediate result of an influence attempt may be that a follower is willing to do what the leader asks. A more delayed effect of leadership is how well followers actually perform the assignment" (Yukl 2006, 11).

Leadership interprets human behavior as a certain fact, because people already have a habit to do something. However, explaining leadership from a biophysical point of view may also be useful. For the research it is important to understand a military unit as a human system in four dimensions (CSEM).

Biophysics describes the human system and its behavior. Every person or group of people is a biological system with many levels and integration links because they have characteristics of systems which interact with the environment in order to exchange substance, energy, and information. Environment influences a system, and a system

influences the environment as well. A biological system is able to perceive external irritants and react to them. A system can be static or dynamic. A dynamic system is able to change its characteristics over time (Volkenstein 1988, 16-19). The system can be open or closed. For an open system the dynamic process of exchange of energy, information is endless during the life of this system. An open system has the ability for quick reaction and adaptation. This system is more survivable than a closed system. The steady state of a system can last until the system responds to the environment. Living systems are fundamentally open and thus in non equilibrium (Volkenstein 1988, 15).

A military unit as a system can be both open and closed. A person or a subordinate is an open system in respect to a military unit. A subordinate can stay in this unit until his interest and level of development changes or his salary no longer provides a decent living standard. For example, if his salary is too small because of disproportional increasing prices his probability of leaving this unit will increase. It will be a moment when it does not make sense to stay in the military unit because the salary does not provide an appropriate standard of living. If a commander would increase salary or give him other benefits, the subordinate might stay in the unit. By increasing the salary a commander responds to the increasing cost of living and, therefore, makes a military unit an open system which is able to react to the influence of the environment. Thus, a military unit becomes an open system in equilibrium with current conditions.

After an exterior influence every biophysical system tries to return to the previous state. An open system is characterized by the presence of input and output signals. An exterior signal can influence a system, and a system responds to its impact. The law of behavior of the system determines the dependence of the output value from the input

action (Volkenstein 1988, 16-19). To understand the behavior of a system we have to deal with input and output signals and the law of behavior of the system.

In spite of a changeable environment and the reaction of a system to it, a commander has to maintain a military unit functional and directed to accomplish a mission. It means a commander has to provide the equilibrium principle of a human system. Equilibrium within a human system does not necessarily mean a complete lack of change. Change can be a condition of equilibrium (Albrecht 1978, 93-95).

The literature does not address widely the problem of leading a military as a four-dimensional system (CSEM) in a DE. Morris and Sashkin have described Force-field analysis (FFA) as a method for identifying the psychological and social forces that affect people‘s behavior (1976, 130-34). They have explained behavior inside of a group as a fluctuation of actual behavior between ideal (most desirable) behavior and worst (least desirable) behavior in respect to positive (driving) and negative (resisting) forces. In spite of the practicable value of the model it does not focus on an influence of a DE, which is actually a combat situation where the mission can change quickly in comparison with a civilian organization. Thus, to describe the correlation between a leader‘s power, a leadership style and an influence of environment at critical points under increasing stress might give commanders recommendations to lead a military unit in a DE.

The explanation of a military unit as a human system is fundamental for this research. Litterer describes the organization as an open self-regulated system with adaptation for change (1969, 194- 96). The limitations of the system are critical to analyze the unit‘s behavior in a DE. So Litterer describes the organization as a system and defines the individual organism as a channel for input and output signals. He shows

that there are limits to the capacity of the human channel which could define limitations on leadership (1969, 315-20).

Thus, the interpretation of a military unit as a biophysical system can help to describe better a process to lead subordinates in a DE and build a military unit with the principles of a learning organization.

It is possible to assume that the four-dimensional model of CSEM is in a state of flux because these four domains are changeable. They can change in different ways and independently from each other. To predict the future result is a complicated process. A commander and subordinates separately from each other have their own characteristics such as character, maturity, abilities, knowledge, skills, mood, health, and so on. The external situation can be defined by changes in weather, terrain, weapons and equipment. The mission is changeable also, but can stay more or less stable depending on the level of the mission (tactical, operational or strategic).

The subject of leadership in literature sources mostly is described as a static process in which all domains (CSEM) remain constant. In a military setting, however, the domains change quickly and a commander has to change his leadership tools in order to lead a military unit effectively. Moreover, keeping the previous leadership style can decrease the effectiveness of a military unit or completely destroy it. Therefore, to understand the process of leadership in a DE is vitally important in order to maintain unit effectiveness.

The literature sources do not describe in detail change as a process, but implementation of leadership in a DE requires this description. The problem of leading subordinates in a DE has two sides: psychological and philosophical. A military unit as a

system has a high level of resistance because of the nature of a military unit and its tasks. To change a leadership style means that a commander must first change himself. A military job, especially in a combat situation, requires people with a high level of resilience on the one hand and a high level of adaptability and flexibility on the other hand. This is important for both commanders and subordinates as well because the process of adaptation is a double-sided process.

Davis and Newstrom have divided resistance in three types: logical, psychological and sociological. They maintain that ―dgical resistance is based on rational reasoning and science; psychological is based on emotions, sentiments, and attitudes; and sociological is based on group interest and values" (1989, 291-92).

Naturally human characteristics such as resilience and flexibility are opposite of each other. To combine them in one person is possible when the person understands logically and mentally the reasons for change. To make a change, especially as one's own decision, for a person with a strong will is difficult. To make this change is not a weakness in the person. It is a change on the cognitive level, which might be much more difficult than a physical change. To make a change cognitively, a commander has to understand clearly the sense of the change and has to have knowledge of leadership concerning this problem. The method of leading subordinates in a DE with leadership theories can help a commander to understand better subordinates' behavior and use the right tool at the right time.

Knowledge of contingency theories of leadership is important for a commander. ―These theories maintain that leadership effectiveness is maximized when certain leaders correctly make their behavior contingent on a certain situation and follower

characteristics" (Hughes, Ginnett, and Curphy 2006, 361). Contingency theories see leadership in three fixed dimensions as leader-follower-situation (L-F-S), but they may not be effective to lead subordinates in a DE when these dimensions are changeable.

The Normative Decision Model describes the result of delegate decisions in the L-F-S dimensions. Vroom and Yetton (1973) designed the theory to improve some aspects of leadership effectiveness. —They explored how various leader, follower, and situation factors affect the degree of subordinates' participation in the decision-making process and, in turn, group performance" (Hughes, Ginnett, and Curphy 2006, 362). The normative model is one of the best of four major contingency theories of leadership but it has some disadvantages also. For example, according to Miner (1975) leaders who use the model do not make more effective decisions than leaders who do not use this model (Hughes, Ginnett, and Curphy 2006, 367). A commander has to make his own decision in every particular situation. Therefore, it is vital to see the whole process of leadership in a DE and be creative and flexible.

Hersey and Blanchard (1969) introduced the Situational Leadership Model (Hughes, Ginnett, and Curphy 2006, 368). According to this model the level of subordinate maturity determines that a leader might use a mixture of task behavior or relationship behavior to lead subordinates effectively. This model is not universal, however. So little evidence exists that using the combination of task and relations behavior will make leaders more effective (Yukl 2006, 224). Moreover, this model works in a static situation when the maturity of subordinates has four constant degrees. In reality the maturity of subordinates is changeable, because they are developing and their skills, knowledge and confidence will change over time.

Fiedler‘s (1967) LPC (the least preferred coworker score) Contingency Model is a contingency theory which proposes that selecting the right kind of leader for an appropriate situation or changing the situation in order to adapt it for the particular leader‘s style will determine leader effectiveness. The least preferred coworker (LPC) score defines with whom the leader has the greatest difficulty working. According to Fiedler (1978) the current interpretation of these scores is that they identify a leader‘s motivational hierarchy (Hughes, Ginnett, and Curphy 2006, 372-73). Low-LPC leaders are motivated by the task and get satisfaction from task accomplishment. High-LPC leaders are motivated by relationships and satisfied by establishing close interpersonal relationships. The relationship between leader LPC score and effectiveness depends on a complex situational variable called situational favorability which shows which situation gives a leader control over subordinates (Yukl 2006, 216).

LPC Contingency Model has some serious weaknesses. For example, ―LPC scores may be not constant over time and may be more complex than assumed” (Yukl 2006, 217). Kennedy (1982) and Shiflett (1973) have found that the model neglects medium LPC leaders in spite of the fact that they can be more successfully in balance affiliation and achievement concerns (Yukl 2006, 218). Choosing a right leader for a particular situation or changing the situation for a certain leader is not always the appropriate procedure. This theory can work in stable conditions, but it would not be perfect in a DE.

The Path-Goal Theory explains how the behavior of a leader influences the satisfaction and performance of subordinates. According to House, ―The motivational function of the leader consists of increasing personal payoffs to subordinates for work-

goal attainment and making the path to these payoffs easier to travel by clarifying it, reducing roadblocks and pitfalls, and increasing the opportunities for personal satisfaction en route" (1971, 324).

The Path-Goal Theory has some conceptual weaknesses. So Behling and Starke (1973) have found that "this rational decision model provides an overly complex and seemingly unrealistic description of human behavior" (Yukl 2006, 222). Thus this theory is valuable in order to understand the behavior of subordinates but cannot give a commander absolutely correct advice in a DE.

In summary, four of the well-known contingency theories of leadership can help to define behavior for a leader in order to improve leadership effectiveness. The contingency theories require certain conditions when characteristics of a leader, subordinates and situation are constant. In reality, characteristics of subordinates and a leader are changeable. For this reason, to follow strictly the theories will not provide absolutely right recommendations to a commander for practical use. In spite of this, the theories will help a commander to react correctly in certain situations because they are parts of a dynamic process.

A DE characterizes a transition period for a military unit. Davis and Newstrom describe a process of leading in a DE as a process of reaching a new equilibrium. They propose five general approaches to make a change as "(1) adding new supporting forces, (2) removing restraining forces, (3) increasing the strength of a supporting force, (4) decreasing the strength of a restraining force, and (5) converting a restraining force into a supporting force" (1989, 294-98). Their interpretation of making a change during a

period of transition is comprehensible, but to see this process from a biophysical viewpoint would allow for deeper understanding of unit transition.

Change means stress as a structural conflict between the system's previous and future state. It influences the model of CSEM in different ways. Stress always exists in a military unit but at different levels because of the nature of a military job. Therefore, "stress will be a major part of the leadership environment, both in peace and war. Major sources of stress include an ever-changing geopolitical situation, combat stress and related fears, the rapid pace of change, and the increasing complexity of technology" (Headquarters, Department of the Army 2006, 10-7). Consequently, effectiveness of a military unit could be defined by the ability to work under stress.

"We can define stress as a person's adaptive response to a stimulus that places excessive psychological or physical demands on him or her" (Griffin and Moorhead 2010, 167). Selye (1976) explains the general adaptation syndrome and describes concepts of eustress and distress. "According to this model, each of us has a normal level of resistance to stressful events. Some of us can tolerate a great deal of stress and others much less, but we all have a threshold at which stress to affect us" (Griffin and Moorhead 2010, 167-68).

Friedman and Rosenman (1974) divide people in the two extreme types. The type "A" people are extremely competitive, highly committed to work and have a strong stress sense of time urgency. The type "B" people are less competitive to work, and have a weaker sense of time urgency (Griffin and Moorhead 2010, 169).

In spite of a lot of research about stress, the literature sources do not give precise information about critical levels of stress, result of the stress, and ways to influence

subordinates in a stressful situation. Also, the literature sources do not describe the critical boundaries to lead a group such as critical resilience in order to endure stress. It would be important to find a correlation between the critical boundaries of personal resilience, commander‘s power, leadership styles and unit effectiveness. The literature provides no explanation about the connection between these factors and the ability of a military unit to undergo changes in a DE.

A commander has to understand that to be strong does not always mean to keep the same direction or approach. To be an effective commander means to keep a military unit in equilibrium with the environment. A commander has to have adaptability which ―is an individual ability to recognize changes in the environment, identify the critical elements of the new situation, and trigger changes to meet new requirements" (Headquarters, Department of the Army 2006, 10-8).

One of the most important traits for a commander to lead a military unit in a DE, which defines the commander‘s flexibility and adaptability, is emotional intelligence. Mayer and Salovey (1995) have found that emotional intelligence is relevant for leadership effectiveness in many ways (Yukl 2006, 202). Commanders with a high level of emotional intelligence may solve complex problems, make better decisions, adapt their behavior to the situation, and lead under stress. Emotional intelligence can play one of the decisive roles in leading subordinates in a DE, and it would be valuable to focus more on this subject.

The transition of a military unit is a complicated and vulnerable process. During the transition a system moves from one stable state to another. This process is called a

phase transition. In the field of a phase transition the system becomes unstable (Gitterman and Halpern 2006, 16-19).

A stable or unstable state of a biophysical system is analyzed by the special points and also bifurcation points. Special points (see figure 1) define the system‘s state as absolutely stable (center), stable (stable focus) or unstable (unstable focus) states (Volkenstein 1988, 491). The bifurcation points are the system parameters under which the system changes its behavior (Volkenstein 1988, 505-08). The sensitivity of the biophysical system to random external influences increases in the area of bifurcation (Veselova, Veselovsky, and Chernavsky 1993, 45-47). This means that a small signal can influence a biophysical system much stronger than when the system has the stable state. This interpretation of system behavior might explain a dynamic process in a military unit as a human system. To build a bridge from one point to another might be a key to keep a military unit functional and effective during transition. So the commander‘s vision, like a bridge for the transition, is vital.

The literature of leadership does not explain change based on biophysical principles of system behavior. For instance, according to Beer (1988, 1999) a change can be defined as multiplication of dissatisfaction (D), model (M), and process (plan) of change (P). A change can happen when this multiplication is more than resistance (R) of a system for change: $C = D \times M \times P > R$ (Hughes, Ginnett, and Curphy 2006, 394). However, the biophysical interpretation of the nature of change might better explain human behavior and allow determining causes of the problem during the transition period. This way of interpreting a change could help to find an appropriate way to build a military unit as a learning organization. Moreover, the biophysical explanation of change

can help to describe the behavior of subordinates under critical stress which is a part of combat operations.

The literature also does not give characteristics of system behavior in a DE with four dimensions (CSEM). These characteristics will provide an opportunity to describe, analyze the environment and give recommendations for a commander to use.

Interpretation of system behavior in four dimensions (CSEM) might guide a commander in complicated situations when all dimensions can influence each other in different ways. In reality, to predict the result of the mutual influence of four dimensions is difficult. Hence, a commander might make a wrong decision, especially in a combat situation. Knowledge of probable behavior of a military unit as a dynamic system can help a commander to be more confident in making decisions and solving problems.

A leader‘s power and leadership style play a primary role in a DE and have an important place in the research. Klann has highlighted the main two types of power: positional and personal power (2010, 64). He describes different influence tactics of power with hard, soft and rational tactics and also explains the integration of power and influence of subordinates in order to get compliance and commitment (Klann 2010, 67-70). Goleman defines styles to get a commitment--authoritative, affiliative, democratic, coaching--and other styles to get compliance--pacesetting and coercive (2000, 78). A leader‘s power and leadership style cannot work without good communication.

To deal with people a commander as a part of a human system has to communicate with subordinates and with other commanders as well. Klann states that —the more effective the communication, the greater the strength of the bond. Without communication, there is no leadership at all” (2007, 45). He describes in detail

communication in a transition period as casting clear vision, continuous open and honest updates about the change process, and sharing critical information in order to realize change and maintain unit effectiveness.

Bass (1990) has defined communication effectiveness as the degree to which someone tells others something and ensures they understand what was said. Bennis and Nanus (1985) have found that leaders who communicate feelings and ideas are more effective. Also the research of Klimoski and Haynes (1980) has showed that the quality of a leader‘s communication has positive correlation with the satisfaction of subordinates (Hughes, Ginnett, and Curphy 2006, 437). In general, communication, like a liquid, will fill empty places and connect all in one unity to build a stable team.

A commander can use motivation and satisfaction of subordinates in order to keep a military unit in equilibrium with a DE. These two factors play one of the most important roles to lead a military unit and are serious tools in the commander‘s hands.

Literature sources provide various interpretations of motivation. For instance, according to Kanfer (1990), ―motivation is anything that provides direction, intensity, and persistence to behavior.” Campbell and Pritchard (1976) define ―motivation as a sort of shorthand to describe choosing an activity or task to engage in, establishing the level of effort to put forth on it, and determining the degree of persistence in it over time” (Hughes, Ginnett, and Curphy 2006, 243). Job satisfaction is not how hard one works or how well one works, but rather how much one likes a specific kind of job or work activity (Hughes, Ginnett, and Curphy 2006, 243). There is another definition of satisfaction: satisfaction = achievements/goals. Goals nearly always exceed

achievements, and hence, satisfaction increases as achievements approach goals (Myers 1981, 54).

Motivation and satisfaction are commander‘s tools to make a system open and in equilibrium with the environment. Theories of motivation and satisfaction help a commander to make correct decisions and adapt a military unit to a DE.

Four categories of theories describe motivation. The category ―Needs‖ includes Maslow‘s hierarchy of needs (Maslov 1954) and the existence-relatedness-growth (ERG) theory (Alderfer 1969). The ―Individual difference‖ category consists of the Achievement orientation theory, theory of values and intrinsic motivation theory. The ―Cognitive‖ category includes Goal setting theory, Expectancy theory, Equity theory, and Self-efficacy theory. The ―Situational‖ category has two theories: Operant approach theory and Empowerment theory (Hughes, Ginnett, and Curphy 2006, 249).

Motivational theories can help to motivate subordinates in the right way. But some motivational theories maybe appropriate in one situation, but not in another. The commander‘s task is to use them according to the situation and the type of subordinates.

There are also three main theories of job satisfaction: Affectivity theory, Herzberg‘s Two-Factor theory, and Organizational Justice theory (Hughes, Ginnett, and Curphy 2006, 283).

Motivation and satisfaction are dynamic. Motivation today, for instance salary, might not be a motivation in a year. An example for satisfaction, for instance, is running one mile today is a good accomplishment, but it won‘t be enough to satisfy a person in two weeks. The dynamics of motivation and satisfaction may be different and may not have a connection with each other. For instance, money may motivate but may not satisfy

a person. Satisfaction is something more natural, enjoyable and specific than motivation. Also satisfaction increases when subordinates accomplish a task, especially when the task requires a lot of effort (Hughes, Ginnett, and Curphy 2006, 246).

Although satisfaction is not used widely in military leadership, a commander can use this tool by assigning a job position which will be the most appropriate for a subordinate from all the positions which the military unit has.

A commander has to work with subordinates whom a unit already has, but leadership literature sources focus on selecting people during the hiring period. So, Chruden (1980, 114) recommends to select employees during the recruiting time. McClelland (1985) has also proposed that leaders focus on selecting the right people for the right job during the recruiting period (Hughes, Ginnett, and Curphy 2006, 258). The Myers-Briggs Type Indicator (MBTI) and the Campbell interests and skill survey (CISS) work mostly for hiring people.

Military tasks may be more dynamic than in civilian organizations. Therefore, a rotation of subordinates can help to optimize forces to achieve the desired goal for a commander. In a military unit during the rotation process subordinates move to other units and do not stay in one unit forever as compared to civilian organizations where a person can work in the same place for a long time. This dynamic situation forces a commander to deal with selecting appropriate job positions for subordinates. Also the replacement of subordinates with each other in case of need in a combat situation is vital. The literature does not describe this in detail.

Also the correct placement of personnel may decrease conflict or completely eliminate it and will satisfy the social needs of Maslow‘s pyramid of Needs (Maslov

1970). Subordinates can realize their natural abilities because they like doing their job and enjoy it. This allows providing conditions for freedom and a high level of independence which facilitate creative work with elements of art. This could be one of the main tools to change something in a military unit without fear of the future during the transition time.

It might also be important to focus on the level of independence of subordinates as a way to make leadership more effective. The dependence of a person on others may have both a physical and a psychological meaning. Physically we cannot be absolutely independent because in reality a lot of matters depend on others, such as production of food, clothing, transportation, and so on. Psychologically people require different levels of care also. Thus dependence always exists. So the problem is to find a particular proportion of independence and dependence for a person to have maximum comfort. McGregor has proposed that ―the desirable end of the growth process is an ability to strike a balance–to tolerate certain forms of dependence without being unduly frustrated, and at the same time to stand alone in some respects without undue anxiety" (1960, 27).

In conclusion, the literature sources discussed above provide the basis for the research. A research methodology with appropriate mechanisms, tools and procedures will facilitate studying and answering the research questions. The research methodology is described in chapter 3.

CHAPTER 3

RESEARCH METHODOLOGY

The purpose of this research is to find a method of leading subordinates in a DE in order to maintain or increase unit effectiveness. Chapter 3 describes a methodology for the research. Then it will describe how the methodology works and how effective the methodology is. The chosen research methodology is not a copy of known types of methodology but is rather a mixture of them with the main focus on the qualitative research methodology. The logical direction of the research has to draw a clear picture of the research problem. Hypotheses will appear during the research process. The research method can help to prove them and give answers to the research questions.

The author chose this topic of research because he is very familiar with the questions being studied. Based on his experience and observations, to research this topic is valuable for a military unit, especially during a transition period.

The primary and secondary questions reflect current problems in a military unit. To understand them the author has to find analogous situations in civilian life, read literature sources and analyze them.

Literature sources and author‘s ideas have to support and prove the main research direction. In spite of this not all ideas and hypotheses could be really useful to answer the research questions.

Second, the literature sources present a broad picture of the problems and the parallels between theories and real events. Studying leadership in a DE requires more than knowledge of leadership, because the subject of leadership is not enough to explain various problems that arise in a DE.

Research at the boundary of different sciences often gives positive results. It is useful to see the problem of the research from three points of view: science of leadership, biophysics, mathematics and philosophy. The first point of view is leadership with its theories and recommendations. The second point of view is biophysical because a person or a military unit is a human system. The biophysical interpretations can better explain human behavior. This research direction may help to find the essence of the problems and enrich leadership as a science.

The philosophical point of view is important because provides means for explaining unknown gaps which cannot be proven or explained with a special model. There are a lot of problems which are really as complicated as the human brain. In this case we can only mention some facts such as, for instance, mathematic axioms, which do not require any proof. But in spite of this, it may be possible to see an axiom of leadership as a kind of theory and try to prove it. In this case we will go deeper and find more facts which have been hidden before. Philosophy might help to do it. Thus, philosophy as a science creates a base to make hypotheses, builds theories and gives an opportunity for researchers to describe human behavior.

Also viewing the broad picture of a DE would be useful in order to join different science tools to find solutions to the problem. Literature sources describe in detail a lot of information, but it is not so easy to select a required correct interpretation which answers the research questions. Therefore, it is important to keep this broad point of view during all the research process.

The science of leadership has mostly a narrative interpretation so it is not always convenient to do research and make conclusions. For example, a researcher wants to

describe a chain of events which have a natural connection to each other. In this instance finding an answer could be complicated without mathematics. Moreover, mathematical interpretation of facts in the research allows finding a correlation between factors which might be difficult to see at first glance. Using formulas and graphs can help to explain easier different processes, and they might help to find new conclusions and propose some rules which could be easier to explain than narrative explanations. Furthermore, they might provide an opportunity to create common rules to describe and evaluate leadership in a DE. So, a research methodology in conjunction with leadership, biophysics, mathematics and philosophy may help to answer the research questions.

The research methodology is qualitative. This methodology focuses on process, understanding, and meaning with characteristics such as inductiveness and rich description. The primary instrument of data collection and analysis is the researcher (Merriam 2009, 14). The qualitative research has characteristics such as understanding description, discovering meaning, generating hypotheses, flexible, evolving, emergent, purposeful and theoretical (Merriam 2009, 18). These characteristics of the qualitative research are appropriate to study the research questions. The subject of leadership has a lot of theories and experimental interpretations and allows using the qualitative research as a method to study the research questions.

There are various types of qualitative research. For example, Creswell presents five types of qualitative research: narrative, phenomenological, grounded theory, ethnographic research, and case study (2007, 53). According to Denzin and Lincoln (2005) there are six research directions: case study, ethnography, grounded theory, life

and narrative approaches, participatory research, and clinical research (Merriam 2009, 21).

Sociologists Glaser and Strauss introduced Grounded Theory as a type of research methodology in 1967. To discover a new theory from the already known data is the end state of this type of qualitative study (Merriam 2009, 29). The purpose of this research is to find a method to increase unit effectiveness with theoretical recommendations for commanders. A method could be a kind of theory. Hence, grounded theory could be one of the appropriate ways to study the research questions.

There are some types of ground theory studies which are different in gathering of information and procedure to analyze it and make decision. One of them is a ~~"c~~ore category." The core category ~~"m~~ust be central, that is, related to as many other categories and their properties as it possible, . . . must appear frequently in the data . . . and must develop the theory" (Strauss, 1987, 36). Also the core category, the theory consists of categories, properties, and hypotheses (Merriam, 2009, 31). During the research process some hypotheses appear and it would be important to prove them.

Thus, to gather information and analyze it a researcher can define the main direction of the research in order to find answers to the research questions. The rest of the data will be directed to the main idea of the research. The main idea of the research will follow through the research from the start to the end.

A criterion of feasibility of the research methodology is simplicity to find an answer for the research questions. The research methodology is suitable because it allows working with literature sources and analyzing them without additional needs. Sources which have been used in research have high credibility because it is theories of

leadership, biophysics. Analyzing research questions requires information from books which explain theories of leadership and other fundamental knowledge. This information has been proved by testing in many practical situations and exists as a base to continue the study of leadership.

A deductive analysis of information was conducted during the research process. The sense of the research method is a chain of events which follow according to the main research direction. If there is an unknown gap it would help to fill this by hypothesis and later prove it. Deduction can be expressed in a use of formulas like a way to find a connection with other facts. Mathematic interpretation helps to see a continuation of the process and after that to find a new idea and describe it. Description interpretation and mathematic interpretation are double sides of one coin. They help each other to find answers for problems. Description interpretation and narrative analysis could build an analytical approach to the problem, and mathematic interpretation might give a way to describe an unknown process. It can be an answer for the research questions. This method of research provides conditions to write hypotheses which are one of the distinguishing characteristics of a qualitative research.

Use of leadership, biophysics and philosophy with their common boundaries could answer the research questions and may also prove hypotheses. The relative view of the research questions from different scientific points of view makes the study picture wider. It allows crossing the boundaries of a traditional description of the problem and finding new information which could answer the research questions.

So, the qualitative research methodology with elements of grounded theory helps to study the research questions. The combination of leadership, biophysics, and

philosophy with mathematical tools allows seeing the broader picture. It creates conditions to study leadership in a DE and describe it. The analytical approach makes the research not only theoretical but practical also. So, mathematical formulas could evaluate a commander, subordinates, and a military unit and predict the result of commander‘s leadership in different situations.

People are not mathematic models, but they have natural traits, abilities, and limitations which are relatively constant to comparison with characteristics of a DE. The resilience and mental level of a person can be changed, but it will take much more time then to change a situation or mission. Therefore, it is possible to assume that human characteristics are relatively constant. Hence, we can evaluate them and assess a commander and subordinates as well.

The primary research question defines the research direction. The research methodology follows this direction through the research.

The author‘s observations during military service as a commander at different levels will be the initial unproved data for analysis. This military experience provides motivation and interest to study the research questions. The literature sources are the main data for the research, which have to prove hypotheses. The research methodology has to analyze literature sources and hypotheses from this service experience in order to answer the research questions.

The author will arrange information into coherent categories which support the main idea of the research. In spite of this he uses emergent categories also. It gives an opportunity to find some information which at first does not have a direct connection

with the primary research question. But later it will help to understand that it is a unity of one problem and get a key answer for some research questions.

After analyzing the information it will be identified the connections within and between categories. During the research the selection of valuable information happens automatically according to the main idea of the research. Categories of the data have relative importance. Some of them are key information, but others are just to support and explain better the core of main categories. So there are key categories and subcategories.

It is possible to find the most significant results where leadership and biophysics interact. It is important to look for relationship which can explain why something occurs. For example it might explain the nature of resilience and change in a military unit. Understanding this gives a confident and reasonable direction to studying the problem about a learning organization and an effective method to lead a military unit. After gathering, categorizing, and analyzing the information it will be interpreted all together. Then it has to be found the major significant results from the research and write a final analysis.

To work with qualitative data could be a science and an art with critical, analytical thinking and creative, innovative perspectives. This approach will help to organize the study of the research questions in chapter 4.

CHAPTER 4

ANALYSIS

Introduction

The Ukrainian Army has many outstanding leaders at all levels. However, it does not have formal classroom leadership education as is conducted at the US Army‘s Command and General Staff College. Many of the leadership manuals currently used by the Ukrainian Army are those of the former Soviet Army. These are generally from the period of the 1940‘s and The Great Patriotic War. Considering the advances in military leadership thought, the leadership lessons learned from the global war on terror, and the accelerated military operation tempo in Ukraine, a new leadership model needs to be created for the Ukrainian Army. Therefore, the purpose of this research is to find a method of leading subordinates that would significantly increase unit effectiveness in a DE.

This is a model that could be used as the foundation for a change in the leadership culture of the Ukrainian Army. The originality of this work will be its use of mathematical formulas to explain the key leadership methods/ideas proposed within the study.

Chapter 4 will follow according to the research questions.

The primary question:

How is it possible to increase unit effectiveness by means of leadership?

The secondary questions:

1. How flexible, adaptable, and versatile must the leader be in the process of change?

2. What is the method of leading subordinates in a DE?

3. What is the procedure to implement the method of leading subordinates in a DE?

4. What is the method to assign the right job to the right person?

Chapter 4 will answer three questions: what a commander has to do, why he has to change his leadership and when he has to do this in order to maintain unit effectiveness.

To study the research questions it is important to see a military unit as a human system with four dimensions: (1) commander, (2) subordinates, (3) environment, and (4) mission. Equilibrium between them can maintain unit effectiveness. To do this requires a change of a leader‘s power, leadership styles or a unit‘s structure.

A change is defined as a new state of the system with characteristics which are different from the previous one. A commander, subordinates, an environment and a mission are always changeable. The commander‘s task is to lead subordinates effectively under conditions of continuous change.

—Leadership is a process of influencing people by providing purpose, direction, and motivation while operating to accomplish the mission and improving the organization” (Headquarters, Department of the Army 2006, 1-2). To analyze a military unit as a human system it is possible to define leadership also as a process to achieve a desired goal by doing three things: create equilibrium between a military unit and the environment, provide conditions for feedback, and finally, control. They are key factors to regulate a military unit as a system. To do this effectively a commander has to utilize the various means of communication which plays a primary role in leadership.

Chapter 4 is divided into three parts: (1) analysis of the commander‘s, subordinates‘ and unit‘s behavior; (2) method of leading subordinates in a DE; and (3) putting into practice the method of leading subordinates in a DE.

Part one describes the behavior of a human system in a DE which is fundamental to understand the research.

Part 1. Analysis of the commander‘s, subordinates and unit‘s behavior

Behavior of a human system under exterior influence

Understanding a unit‘s behavior will help to analyze leadership in a DE. To research this requires seeing a military unit as a biophysical system. According to a philosophical encyclopedic dictionary (Il'ichev et al. 1983, 570) ~~–a~~ system is a complex of elements which have the relationships and communications with each other that form certain integrity and unity.” A military unit interacts with the environment by exchanging substance, energy and information. Therefore, it is possible to imagine a military unit as a biophysical system. Since the biophysical approach explains the nature of human behavior under stress and determines important characteristics required to conduct the research, it will be discussed in detail.

Every biophysical system after exterior influence tries to return to the previous state. An open system is characterized by the presence of input and output signals. An exterior signal can influence a system and it responses to its impact. The law of behavior of the system determines the dependence of the output value from the input action (Volkenstein 1988, 16-19). To understand the behavior of a system we have to deal with input and output signals, and the law of the behavior of the system.

Every person or group of people is a biological system with many levels and integration links because they have characteristics of systems which interact with the environment in order to exchange substance, energy, and information. Environment influences a system, and a system influences the environment as well. A biological system is able to perceive external irritants and reactions to them. A system can be static or dynamic. A dynamic system is able to change its characteristics (Volkenstein 1988, 16-19). The system can be open or closed. For an open system, the dynamic process of exchange of energy and information is endless during the life of this system. An open system has the ability for quick reaction and adaptation. This system is more survivable than a closed system. The stationary state of a system will last until the system responds to the environment. Living systems are fundamentally open and thus in non -equilibrium (Volkenstein 1988, 15).

Evolution of the system and its degree of organization can be represented by the phase portrait of the system. This compact and handy method, originally appeared in the mechanics, is suitable for visual description of the behavior of a dynamic system (Veselova, Veselovsky, and Chernavsky 1993, 42-44). Every moment of the oscillating system on the plane, coordinates of which are position (X) and velocity (Y) system corresponds to one point (X, Y). It reflects a certain phase of the oscillation of the system. The terms phase plane and phase portrait of system behavior arise from here (Volkenstein 1988, 16-19, 505-08). The stationary state to which the system approaches, making damped motion is called a stable focus (see figure 1).

So, the stable focus is a point to which all phase trajectories of the spiral forms are directed. The phase trajectories may be viewed as spirals nested in each other. An

unstable focus (figure 1) is characterized by movement "representing" a point on a spiral going away from the focus (Veselova, Veselovsky, and Chernavsky 1993, 45-47). A system‘s state such as ―center” (figure 1) does not exist in living nature.

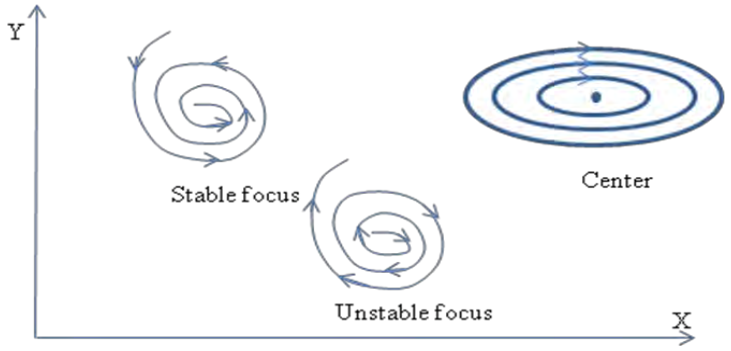

Figure 1. Types of special points
Source: M. V. Volkenstein, *Biophysics* (Moscow: Science Publishing Company, 1988), 491.

Processes in nonlinear systems, such as with human systems, often have a threshold character. With a smooth change in external conditions, the system‘s behavior changes abruptly, the values of the parameters that lead to such jumps are called branch points or bifurcation points (Kapitsa, Kurdyumov and Malinetskii 2003, 55).

The stable or unstable state of the system is analyzed by special points and bifurcation points - values of the parameters of the system under which it changes its behavior (Volkenstein 1988, 505-08). The bifurcation point is a point of a threshold change in a system‘s structure. This may be a system with a new function different from the previous one.

The influence of environment or level of stress (Lstr) is the input signal. Resilience of the system (Rstr), i. e. the output signal, is the response of the system to

Lstr. Lstr and Rstr are special points which describe how far the system is from a stable state. Rstro (see figure 2) is maximum personal or group resilience when the human system is still stable. After this point the human system becomes unstable and changes its parameters. Lstro (see figure 2) is a maximum level of stress which the human system can endure without losing stability. Rstro corresponds to Lstro under which the system starts losing its stable state and cannot return to the previous stable state.

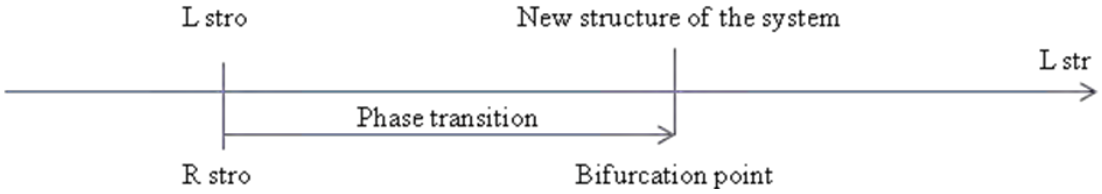

Figure 2. Phase transition, special and bifurcation points
Source: Created by author.

Unstable states of a dissipative system can occur far from the equilibrium. These unstable states facilitate a transition of the system to a new stage which is called phase transition (Volkenstein 1988, 505-08). During the phase transition (see figure 2) a system will approach the bifurcation point, change behavior and hence its structure. In the field of phase transitions, the system is unstable (Gitterman and Halpern 2006, 16-19). Moreover, the sensitivity of the system to random external influences increases in the bifurcation area (Veselova, Veselovsky, and Chernavsky 1993, 45-47) and the system becomes more vulnerable.

An important characteristic of the system is the stability of its steady state. If a sufficiently small deviation from the steady state of the system never deviates far from

the steady state and returns to it again it means the system‘s state is stable (Veselova, Veselovsky, and Chernavsky 1993, 45-47).

Thus, the explanation above about behavior of a human system under an exterior influence is fundamental in order to find a method to provide leadership to subordinates in a DE.

In analyzing the behavior of a human system, it is important to understand that a person as a system tries to get to another stable state with minimum losses of energy. So, leadership theories prove that human behavior is equal to behavior of a biophysical system.

—Goal setting theory, equity theory, self-efficacy, and expectancy theory . . . assume that people make rational, conscious choices about the direction, intensity, and persistence of their behaviors, and generally engage in behaviors that maximize payoff and minimize costs” (Hughes, Ginnett, and Curphy 2006, 287-88). A person looks for an optimal way to achieve desired goals with minimum losses of energy. Accomplishment of the task is already a new stable state for the person. At this moment nobody will force him to do something else because he and his boss are satisfied. A biophysical system is similar to peoples‘ behavior in the phase transition because the system adapts to the environment with minimum losses of energy.

A person cognitively analyzes the situation:

1. If the reward (outcome) is small he will not do this job.

2. Does he need this?

3. What is the balance between forces and performance at the end?

4. Is it worth these forces, time?

All these steps above are based on the Maslov's hierarchy of needs (1970). After the first level is fulfilled a person will go to the second level, and after its satisfaction will go to the third, fourth and fifth levels. If the goal is important a person will try to achieve this with the minimum loss of money, forces, and energy. A human system as an open equilibrium system has a strong connection with the environment which is family, friends, and members of other organizations. A commander has to evaluate that in order to effectively lead subordinates in a DE.

Again, the biophysical approach explains the nature of human behavior under stress and determines important characteristics required to conduct the research.

Coefficient of personal stability

Personal stability is the foundational characteristic to analyze leadership in a dynamic environment. We will call it the coefficient of personal stability (Cps) which determines the ability of the person or group to make a right decision, remain effective and functional under stress.

There is a strong connection between the ability to make a decision, the level of stress and a unit's effectiveness. For instance, cognitive resources theory (Fiedler 1986, 532-48) explains how intelligence and experience are connected with performance. The theory explains why an intelligent leader can make incorrect decisions under stress.

> —Under high stress, a leader is more likely to be distracted and unable to focus on the task. Intelligence provides no advantage, because it cannot be applied . . . . Presumably, experienced leaders rely mostly on intelligence under low stress, and they rely mostly on experience under high stress. Leaders with little experience rely on intelligence in both

situations" (Yukl 2006, 236). Thus cognitive abilities and experience of a person play an important role in a unit's effectiveness.

Experience might influence the resilience of a person. This kind of resilience is called training resilience (Rtr). Intelligence might rely more on personal emotional intelligence (Hughes, Ginnett, and Curphy 2006, 188-91). Sensitivity is an important characteristic which influences personal stability also. Cognitive resources theory suggests that intelligence (emotional intelligence) and experience (resilience) shift and compensate each other under stress (Hughes, Ginnett, and Curphy 2006, 186-88). Thus, emotional intelligence (EI), resilience(R) and sensitivity (Sen) can define personal stability. The author proposes to determine personal stability according to the formula 1:

$$Cps = \frac{Lei \times (Rn + Rtr)}{LsenN - \beta} \times 100\% \qquad (1)$$

Cps–coefficient of personal stability;

Lei–level of emotional intelligence;

Rn–natural resilience;

Rtr–resilience which a person has achieved by an experience and training;

LsenN–a natural level of sensitivity;

β–coefficient of time which shows how long a person has trained for resilience (experience under stress or life experience), coefficient β could not be more than LsenN;

L sen cur–current level of sensitivity (Lsen cur = LsenN – β).

Sensitivity is defined as a human reaction to stress in order to save life.

The person with a high level of EI has better self awareness and social awareness (Klann 2010, 70-71) and can more easily find an exit from a complicated situation. The

person with high resilience can endure higher stress and as a result can achieve the desired goal. Resilience can grow during one‘s life because of life experiences, knowledge and training. For example, an experienced soldier can endure a combat environment easier than a young, inexperienced soldier.

If the influence force grows, a person will not be able to endure this. It is the last point - Lstro (see figure 2), after which a human system becomes unstable. At the point Lstro the person has the maximum resilience Rstro (see figure 2), which still allows him to maintain stability. So, a commander has to know this and be careful when doing resilience training (Rtr).

A lot of athletes in sports such as wrestling, boxing increase Rtr, cross Rstro and are injured to varying degrees. High EI could protect them. Therefore it is possible to assume that a person can achieve higher current resilience (Rcur) if he has a higher level of EI. In this case the person can endure high stress and also remain flexible in order to solve the problem. Hence, a commander with high levels of Rcur and EI can lead subordinates more effectively. Moreover, subordinates prefer following a commander with these qualities. Thus, the commander with high Rcur and EI can insure the military unit remains stable, can solve complicated problems and can also accomplish the mission successfully.

It is possible to improve EI (Hughes, Ginnett, and Curphy 2006, 191). Development of EI makes a commander stronger under stress. If the level of EI is not high it is likely to increase Rcur with training (Rtr), but the person does not have to cross the dangerous point of Rstro (see figure 2) when a system starts losing stability.

According to formula 1, a person can be more sensitive (or weaker than someone else), but a high level of EI can allow him to have higher Cps than a person with greater experience (Rtr) and a high natural resilience (Rn). EI could grow with Rtr, but it would be a parallel process.

Thus, subordinates could prefer to have a commander with high Cps and, hence, he has the higher probability to lead them effectively.

In order to prove formula 1, it is possible to imagine that R current achieves R stresso (see figure 2). Therefore there is a critical moment when a person starts losing his stability. Cps will go down sharply after this. It is a moment when $\beta \geq LsenN$. In reality, increasing current resilience ($Rcur = Rn + Rtr$) aspires to Rstro and decreases LsenN. So, to achieve Rstro could mean destroying sensitivity completely.

$$(Rcur \longrightarrow Rstro), \quad \beta \uparrow \text{ and } Cps \downarrow$$

According to formula 1, when $\beta = LsenN$, Cps does not exist because we cannot divide by the digit "zero." Coefficient β grows during a person's life or he becomes less sensitive. In other words, when increasing Rcur a person decreases LsenN. Coefficient β helps to link the nonlinear correlation between sensitivity and resilience. EI and Rtr also have a nonlinear connection and increased experience might increase EI.

The connection between sensitivity and resilience is nonlinear. It is therefore possible to assume that close to the point of Rstro (see figure 2) resilience grows very slowly, but the current level of sensitivity goes down and the coefficient β increases very quickly. At this period of time a human system is becoming out of control and starts losing stability.

After crossing point Lstro a human system still has the same structure but entrances phase transition (see figure 2) and becomes unstable (Gitterman and Halpern 2006, 16-19), and cannot return to the previous state or previous —comfort zone" (see figure 24). This represents destruction of or change in a system structure. The phase transition can last a month, a year or more.

Resilience (R) may grow together with the level of EI. With growing resilience the person could approach the dangerous point of Rstro (see figure 2). At this moment EI stops growing and then may go down. EI stops working because the human system (the person) is already unstable or unmanageable.

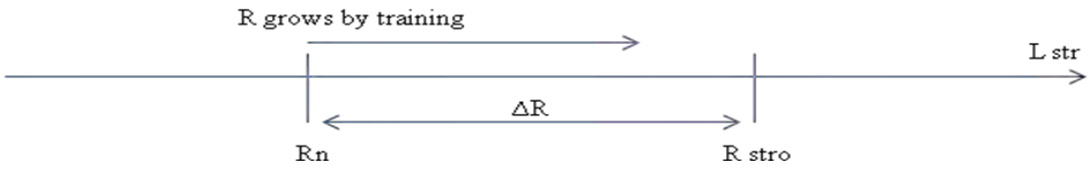

Figure 3. Dynamic of resilience
Source: Created by author.

Thus, when R ≥ Rstro EI decreases and becomes less than normal EI. This means that a person starts losing control. So, it is possible to train and improve resilience up to the point of Rstro.

Everyone has a different natural resilience (Rn). If someone has high Rn it means that his Rstro will be high also, but the gap ΔR (see figure 3) might be approximately equal for everyone.

It is possible to be close to Lstro when the human system will still be in a stable state, but with a high frequency of fluctuation (—nervous"). To avoid approaching the

point Lstro or Rstro could help with recommendations —what leaders can do to take care of themselves during a crisis" (Klann 2003, 81). These recommendations could relax a commander in order for him to go back to a —comfort zone" or an attempt to come back to Rstro if he has already crossed this point. These recommendations might be more appropriate if a leader has not yet crossed the Rstro threshold.

People, who have crossed Rstro use alcohol or smoke a lot in order to calm themselves. For them it is a start of an unmanageable phase transition and they cannot return to their previous condition. They may make a number of attempts, but it is really difficult and perhaps even impossible to return. People have different Lstro, but for many of them who fought in a war it might mean crossing Lstro.

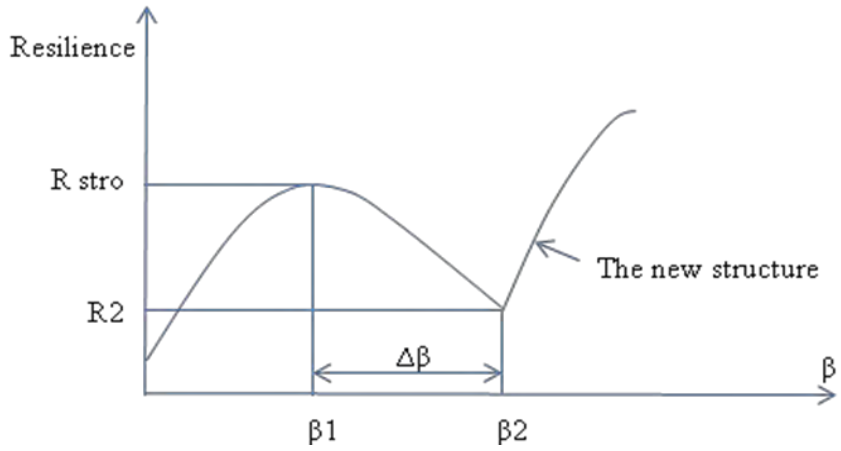

Figure 4. Coefficient of time β

Source: Created by author.

In zone Δβ (see figure 4) a person as a system is already in an unstable state. The movement to the point β2 means that he is becoming more and more unstable. A person loses control and becomes like a robot with a very low level of sensitivity. It is a process

of self-destruction. Exactly in the point β2 the system has to acquire a new structure, which could have an absolutely different function that the previous one (β2 corresponds to a bifurcation point).

The author proposes to determine the coefficient of unit‘s stability according to formula 2 or 3:

$$Csu = \frac{\sum_{i=k} Cpsi}{k} \times 100\% \qquad (2)$$

$$Csu = Cpsmin \qquad (3)$$

Csu–coefficient of unit‘s stability;

Cpsi–coefficient of personal stability of i-member of a military unit;

k–number of members in a military unit;

Cpsmin–the lowest Cps in a military unit (the weakest member of a unit).

It is possible to use both formulas because a military unit is affected by synergy and group unity (Sofo 2000, 265). A person with high Cps will help (compensate) for the lack of resilience of another member of the military unit. For example, if Cps1 < Csu cohesion and unity of subordinates will increase under stress and everyone will become closer to each other. Relationships between a commander and subordinates will be friendly and warm. Therefore, formula 2 can define Csu. Formula 3 can be appropriate also because the lowest level of Cps is the worst case.

Formula 1 defines the coefficient of personal stability which can determine readiness of a military unit for future challenges. Cps is critical in order to explain a method to lead subordinates in a DE.

Time to make a decision

Every person requires a different period of time to make a decision or reaction for change. It is a valuable characteristic of an effective commander.

ΔTc (see figure 5) - time to understand that a change is required because the unit's effectiveness decreased. ΔTc could depend on Lei, situational awareness and situational understanding. Then ΔTc is smaller and effectiveness is higher. At point 2 a unit's effectiveness (Lef 2) is higher than at point 3 (Lef 3) (see figure 5). Δ Tc depends on Lei, Cps or R. Δ Tc = f (Lei, Cps, R). Hence, it is possible to determine Δ Tc according to formula 4:

$$\Delta Tc = \frac{R}{Lei} \qquad (4)$$

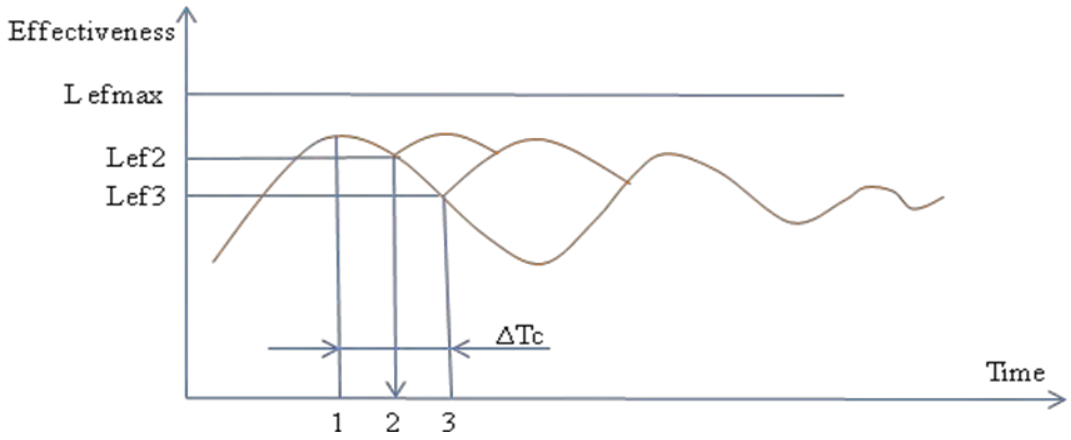

Figure 5. Commander's reaction to make a decision and the unit's effectiveness
Source: Created by author.

Δ Tc can define personal flexibility. The author proposes to determine the coefficient of personal flexibility (Cfl) according to formula 5.

$$Cfl = \frac{1}{\Delta Tc} = \frac{Lei}{R} \quad (5)$$

Cfl shows the commander's ability to change leadership styles. The majority of elderly people have a high R and as a result they have a low Cfl.

The behavior of a leader in a dynamic environment

In a DE a commander with one leadership style would not always be effective. Leadership theories mostly work in a fixed situation with constant characteristics for the leader, subordinates, environment and mission. In reality, however, they are changeable. For example, according to the situational leadership model a leader has to use a certain style with a certain level of follower readiness. "Follower readiness refers to a follower's ability and willingness to accomplish a particular task" (Hughes, Ginnett, and Curphy 2006, 370).

"The contingency model suggests that the leader's effectiveness is primarily determined by selecting the right kind of a leader for a certain situation or changing the situation to fit the particular leader's style" (Hughes, Ginnett, and Curphy 2006, 372-73).

The least-preferred-coworker (LPC) scale (Fiedler, 1978) "instructs a leader to think of the single individual with whom he has had the greatest difficulty working (the least-preferred coworker) and then to describe that individual in terms of a series of bipolar adjectives (friendly-unfriendly, boring-interesting, sincere-insincere). Those ratings are then converted into a numerical score . . . based on their LPC scores, leaders are categorized into two groups: low-LPC leaders and high-LPC leaders" (Hughes, Ginnett, and Curphy 2006, 373). To analyze this theory, "Fiedler (1978) suggests that the

LPC scale cannot accurately identify the motivation hierarchy for those individuals with certain intermediate scores" (Hughes, Ginnett, and Curphy 2006, 374). This theory requires stationary conditions also with a certain combination of subordinates and commanders.

Thus, these theories do not explain the procedures how best to lead subordinates in a DE. They only prove the fact that a commander with his leadership style has to respond to the type of subordinates and the specific conditions of the environment.

There is a big difference between the behavior of a civilian leader and that of a commander. A military unit is more often under stress then a civilian organization. Hence, understanding the procedure to lead subordinates in a DE, which may be field training or a combat situation, is vital for the military.

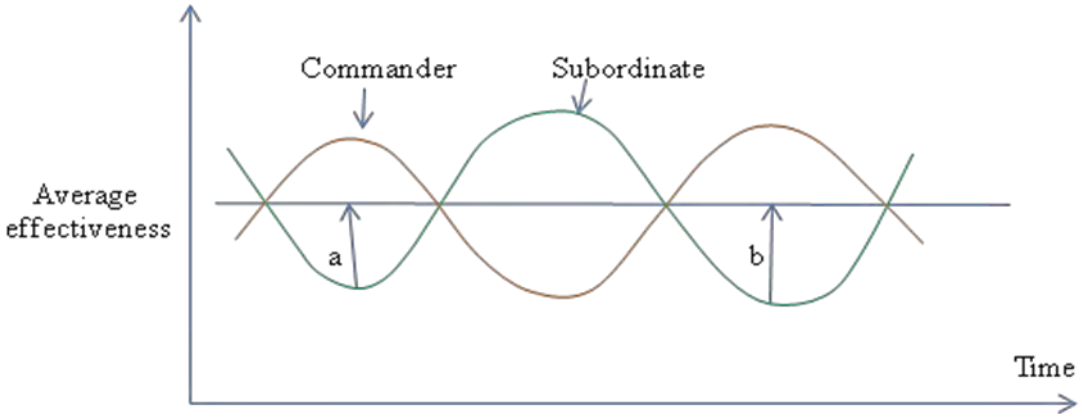

Figure 6. The commander uses influence tactics of power in negative zones "a" and "b"
Source: Created by author.

A commander's actions have to respond to the behavior of subordinates in order to provide a balance or equilibrium with a dynamic environment. When unit effectiveness decreases a commander can use different ~~"~~influence tactics" of power (Klann 2010, 67-

70). In ―negative zones" such as ―a" and "b" (see figure 6) a commander can use soft or hard tactics of power in order to maintain unit effectiveness. The behavior of the environment will define the fluctuation of the commander's behavior, because the environment influences the parameters of the subordinates (mood, health, etc.) and the tasks. A military unit has an average effectiveness range and the commander's task is to maintain the current level of the unit's effectiveness and not go below the average level (Lef cur ≥ Lef aver).

Above the line of average effectiveness (see figure 7) the situation is favorable for the military unit. Under the line, however, the situation is unfavorable, and the unit's effectiveness will decrease if the commander does not control this. The period of time T1–T2 may be an hour, a day, a month or years.

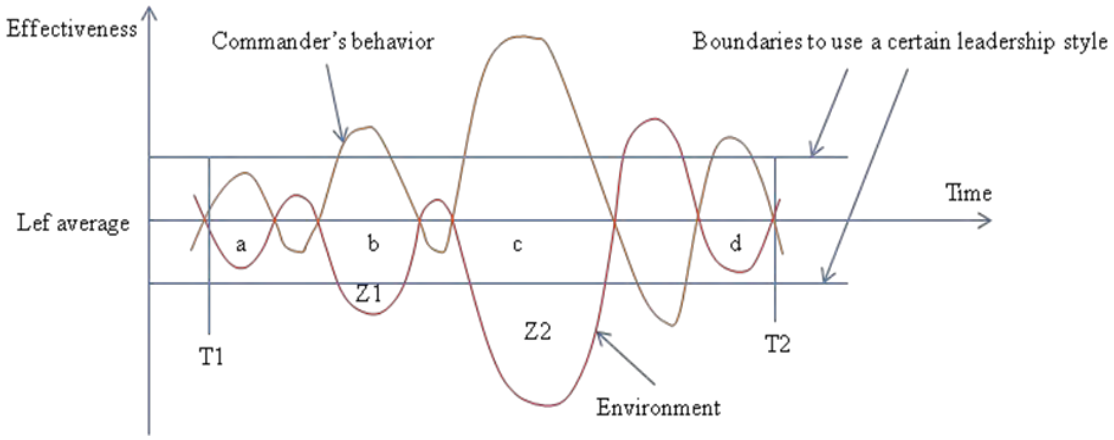

Figure 7. Commander's response to the dynamic environment; ineffective zones Z1, Z2
Source: Created by author.

In negative zones ―a, bç or d" (see figure 7) a commander has to balance the influence of environment with many leadership tools and react in the best way.

Fluctuation of the environment with large amplitude is the normal situation for a military mission. Therefore, zones such as Z1, Z2 (see figure 7) may arise where the leader‘s style does not work or is not effective. To deal with these zones, a commander has to be more flexible and use different leadership styles. In critical conditions the level of stress may be close to the maximum (Lstro) but warm relationships can be established utilizing the commander‘s soft power or possibly hard power also.

It is possible to imagine subordinates and a commander as a group in the box with a constant level of energy. Let us assume they have imagined mental shapes. Under stress they change their mental shapes in order to maintain equilibrium with the environment and to maintain the functionality of the system. To do this a commander becomes softer in his/her approach and seeks subordinates‘ input and concerns.

In a normal situation when the influence of environment is relatively low, the relationships between a commander and subordinates are stable and do not require adaptation or a change of their mental shapes (see figure 8a). If the exterior influence on the subordinates is strong they will start changing their mental shape (see figure 8b). Under strong stress (a combat situation), a commander and his subordinates will have better mutual understanding and may actually become friends.

The natural human need to survive could explain this process. People become closer in dangerous situations. Members of the group maximize their ability to achieve desired goals and help each other as much as possible. During this time the effect of the unit‘s synergy (Simpson and Weiner 1989, 480) could be maximum positive. For instance, the harsh climate makes residents of Alaska more open and friendlier. In this

region it is difficult to survive alone, and they are therefore always ready to help each other.

As a result of changing mental shapes under stress people can understand each other better and establish very friendly relationships even though they have never met before or have not participated in the same military operations. This process unites people and is called ―shared experience."

The subordinate with the lowest level of resilience (S3) could define the group resilience of the group (Rgr). Under stress the S3 (see figure 8c) will change his mental shape more than S1 or S2. The commander's role is to identify this person and then be softer with S3 than with S1 and S2 so that they do not start changing their shapes also as with S3. Therefore, the commander's power and leadership style have to be selective for each subordinate.

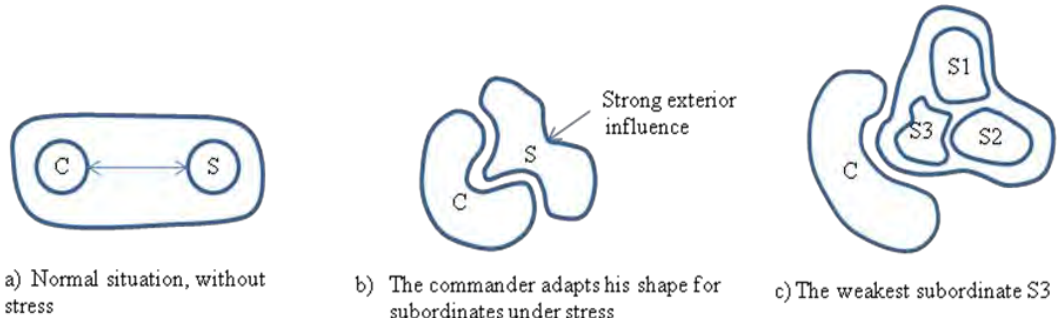

Figure 8. Relationships between a commander and subordinates
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Current military culture and regulations do not allow a commander to use a wide spectrum of leadership styles. They limit the commander and do not let him influence the

—ineffective zone" Z1, Z2 (see figure 7). Also, military philosophy and stricture still divide members of a military unit into commanders of different levels and subordinates. It is not easy to change these traditions and make members of a military unit equal in value because of their job positions, but changing this point of view could make a military unit more flexible, adaptive and effective and connect a military unit into a model of a learning organization.

A military unit is not like a civilian factory, but changing of status of the unit's members could make a military unit more open and balanced in a changing environment. Civilian organizations have many examples of cooperation within the organization. For example, in a Japanese organization job rotation to different levels is a normal process. —The person from another department who is asking for assistance today may be the person who will be his co-worker or even superior tomorrow" (Ouchi 1981, 31).

Understanding of the process of leading subordinates in a dynamic environment

Contingency theories of leadership such as the normative decision model, the situational leadership theory, the contingency model and the path goal theory (Hughes, Ginnett, and Curphy 2006, 385) work in three dimensions: leader-follower-situation. But a military unit creates four dimensions: a commander, subordinates, environment, and mission. If some of them change and they do not respond to theoretical conditions, the theory will not work. Hence, it is extremely important to understand how to lead subordinates in a DE.

It is possible to divide leadership style into two categories: —hard" (H) and "soft" (S). In reality a commander uses a combination of both of them. In a stable situation a

commander can use certain leadership styles according to leadership contingency theories, but changeable situations require a commander‘s flexibility. The question is what kind of power or leadership style to use and when. What is the frequency of fluctuation of a commander‘s behavior under stress?

Stress, as a part of a soldier‘s job, can influence subordinates in different ways. The result of this influence will be different in comparison with a stable situation. Therefore, contingency theories cannot bring about the required effectiveness of a unit. Probable wide frequency of fluctuations of human behavior in a DE can create misconceptions about when the appropriate theory should be implemented.

A high level of stress does not allow for a lot of time to evaluate the situation. Moreover, obtaining a positive result from a theory takes time because subordinates have to understand and change their behavior. Reactions of a commander and subordinates have to be as quick as possible. A stressful situation is unpredictable and the psychological reaction of subordinates is different in comparison to that of a stable situation. Thus, under stress a commander has to monitor the situation carefully and choose an acceptable leadership approach.

A unit‘s behavior can be described as a sinusoidal wave in a nonuniform medium, with loss (see figure 9). There is a critical point where the influence of environment is very strong and the frequency of the system fluctuation is high. A commander‘s response to this could be a change in leadership style because the combination of ―hard-soft” power or increase in power can no longer maintain unit effectiveness.

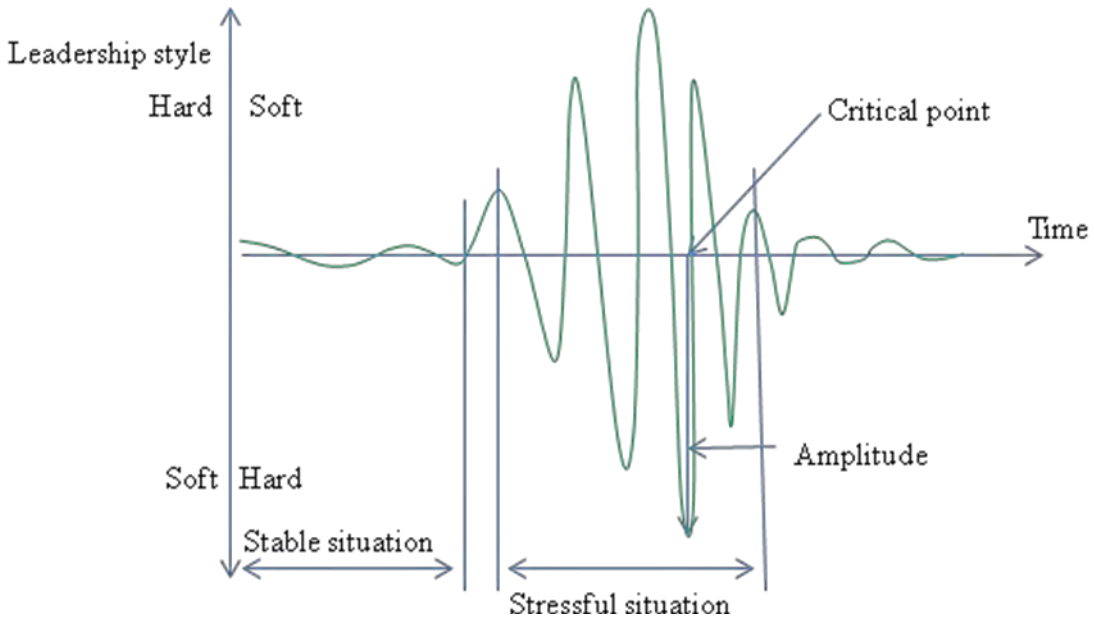

Figure 9. Dynamic of the system and the critical point
Source: Created by author.

In a stable state the frequency of using "H" or "S" power is low and it can be constantly "hard" or "soft" with a certain leadership style. Under low stress the frequency of system fluctuation is also low or equal to zero. Under growing stress, the frequency of the system's fluctuation increases as well. This is a natural reaction of the system under strong exterior influence to maintain stability, which makes the system the most effective. In a stable state the system spends energy only on the job and does not lose energy in order to maintain stability. The specific behavior of the system under strong exterior influence requires great flexibility on the part of the commander.

Thus, there are two important characteristics to utilize when analyzing a unit's behavior: the frequency of system fluctuation (Fs) and the amplitude of fluctuations.

In a DE communication is vital because mutual understanding between subordinates and a commander plays a decisive role in maintaining balance and a stable state. The lines of communication have to be open and natural.

A commander has to monitor the situation and give subordinates the leadership they need at a certain time on the basis of his emotional intelligence (EI), situational awareness and situational understanding (SU). He can use either a hard or soft leadership style (H-S). For instance, if a military unit is effective (usually the situation is favorable) he might use soft power. If, however, a unit‘s effectiveness decreases he could use hard power or vice versa.

Fluctuations of the situation make subordinates‘ behavior complicated and unpredictable. Control of this process allows avoiding negative swings in a unit‘s effectiveness. Therefore, it is important to evaluate a military unit before future challenges became reality. The frequency and amplitude of fluctuations can define required abilities of a commander and subordinates for different situations.

It would be significant to know the points in time when to change a leader‘s behavior. They can have a direct connection with Lstro (Rstro). Before the influence of this level (Lsrto) soft power or hard could be used, but after it only soft power.

A military unit with high Csu (a strong unit) has lower frequency (Fs) and amplitude of fluctuations (A) than a weak military unit. An example of a strong unit is special forces or an airborne unit. This type of unit is more stable and predictable and the commander can lead subordinates mostly with one leadership style and power.

In reality, subordinates have different levels of maturity, motivation, satisfaction, relational skills, coefficients of stability, and so on. This makes leadership complicated

and the selection of the right leadership style becomes primary in order to respond to the exterior environment correctly. For example, the majority of subordinates are more effective when the style is soft (participative) and in this case this leadership style might be for the minority of subordinates also. But if the minority plays a decisive role (the worse case), a commander could also focus on the minority. A commander has to identify the weakest subordinates (problematic group) and focus on them. The weakest group defines the end result. Also the indicator to choose the right leadership tools might be a subgroup with the higher level of influence on the unit‘s effectiveness (decisive group).

To understand logically the process of leading subordinates in a DE and prove the need for a change requires the establishment of the unit‘s characteristics.

The unit‘s characteristics

Unit effectiveness is an important characteristic. Unit effectiveness can be a relatively constant characteristic for a military unit. The author proposes to determine it with formula 6:

$$Ei = \frac{\text{Result}}{\text{Task}} \text{ x } 100\% \qquad (6)$$

An average unit effectiveness can be the average of the sum of an everyday effectiveness of a military unit:

$$Euav = \frac{\sum_{i=n} Ei}{n} \text{ x } 100\% \qquad (7)$$

Euav–average unit effectiveness;

Ei–unit effectiveness on day ~~–i~~”;

n–amount of days.

Euav can shift to a high level and become constant also on a qualitatively new level for a military unit. It could be a new method of leading subordinates, more professional subordinates, or new tactics, weapons and so on. Thus, the average unit effectiveness (Euav) becomes the indicator for the unit‘s assessment.

To analyze a unit‘s behavior requires establishment of certain characteristics. There are: Ir-the influence of environment; Fs-frequency of unit‘s fluctuation as a system; Fef-frequency of fluctuation of unit effectiveness; A-the amplitude of fluctuation; f(x)-the function of behavior of the unit‘s effectiveness (see figure 10). f‘(x) is the first derivation of the function f(x) which predicts the appearance of a critical point and defines them. For example, in points T1 and T2 (see figure 10) f‘(x) = 0 and a commander has to change his/her leadership style.

Δ Lstr = Lstro – Lreal stress (see figure 10)–the current difference between the level of stress which a military unit can endure without losing its effectiveness and a real level of stress or influence of the environment (Ir). When ΔLstr is negative (Lreal stress ≥ Lstro) the unit is not effective and the commander has to change his/her leadership tool in order to maintain the unit‘s effectiveness.

To analyze commander and unit behavior we have to deal with the wave's frequency. The physical meaning of this is: f= v/ λ, where f – the wave‘s frequency, λ - the wavelength, and v- phase speed (Serway and Jewett 2006, 406).

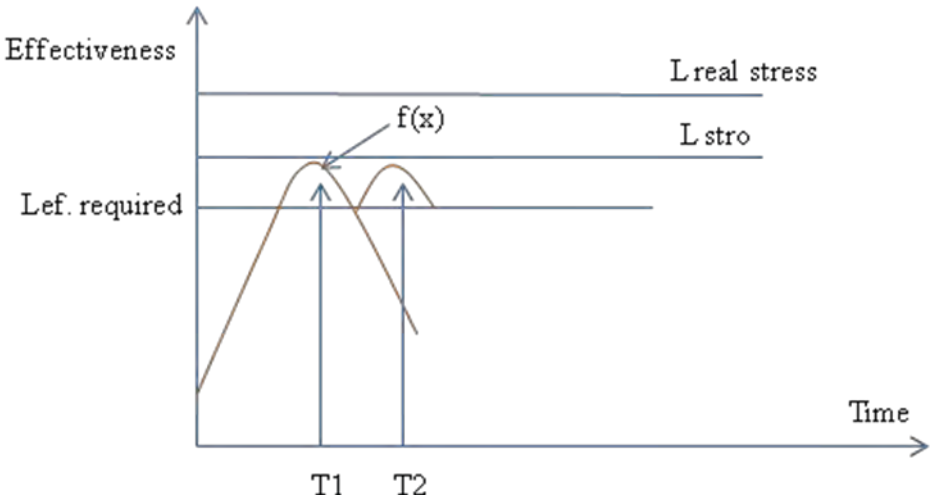

Figure 10. Points (T1 and T2) to change leadership style
Source: Created by author.

A = f (Csu, Ir) - amplitude of fluctuation or reaction on the environment. High Csu decreases the amplitude of fluctuation. The author suggests that frequency of fluctuation of the human system (Fs) is a function of Ir and Csu:

$$Fs = \frac{Ir}{Csu} \times \alpha \qquad (8)$$

α–is a coefficient of nonlinear connection Ir and Csu with Fs.

Frequency of fluctuation of the leader‘s behavior (Fc) means how often a commander has to change his/her leadership style in order to maintain unit effectiveness. Fc is equal to Feff. Also it is possible to suppose that Fc is a function of personal characteristics: Fc = f (Lei, IQ, R).

$$Fc = \frac{\sum m}{\Delta T} \qquad (9)$$

m–amount of critical points where f‘(x) = 0; ΔT–period of time. For instance the period of time T1-T2 has two critical points (see figure 10).

Thus, two completely different types of frequency of fluctuation exist:

1. Frequency of fluctuation of a human system (Fs);

2. Frequency of fluctuation of a commander‘s style or unit effectiveness (Fc).

Under growing stress the military unit as a human system will increase its frequency of fluctuation (Fs) and become ―nervous‖ (see figure 9). A commander has to use different ―influence tactics‖ of power and change leadership styles in order to maintain unit effectiveness.

It is possible to assume that a commander can use one leadership style until the situation reaches the point Lsrto (see figure 2). During this time the effectiveness continues to grow; the unit fluctuates under stress and achieves the critical point (see figure 9) when the system cannot endure the influence of the environment (Ir) anymore with the previous leadership style.

Figure 11 shows the waves of fluctuation of a commander‘s behavior (or unit effectiveness) and the fluctuation of the system. A commander has to change his leadership style at point 1(the critical point) because the unit‘s effectiveness will be going down.

In figure 11, the unit‘s effectiveness is higher than the average unit‘s effectiveness (Lef average) and a commander can keep the same leadership style with different influence tactics of power until the effectiveness reaches the Lef average (point 2). But if a commander decides to improve his unit‘s effectiveness, he should change his leadership style in advance, for example, as at point 3. This point has a higher level of effectiveness

(Lef3) than the Lef average. The commander can also achieve Lef4 which is higher than Lef3 by changing his leadership style again before point 3.

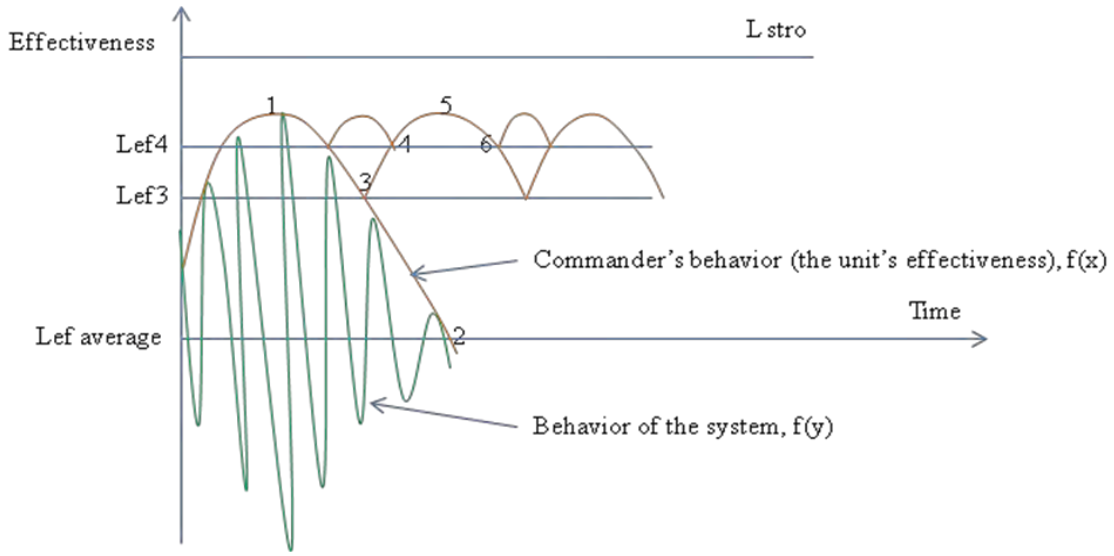

Figure 11. Changing leadership style

Source: Created by author.

At point 4 a commander can change his style again or maintain it. It will depend on how strong the influence of the environment is. At point 6, for example, the influence can become constant so it is possible just to retain an appropriate leadership style. At point 6 the style (energy) might be equal to the sum of the leadership style at point 4, because the unit's effectiveness for these points is similar. The sum of "hard" and "soft" leadership styles (H+S) could be constant. It is possible to assume that H + S = 1.

For example, point 4 may have a combination like: 0.7+0.3 =1; point 6 may have the combination: 0.3+0.7 = 1. Hence, the leadership style at point 4 is not the same as the style at point 6, but both of them provide the same unit's effectiveness.

Point 5 is as critical as point 1. A unit after stress and hard work until achieving point 5 may require more rest at point 6 in order to not be less effective than it was at point 4. At point 4 the dynamic was positive, but at point 6 it is negative. This process has been explained by the general adaptation syndrome, when individual resistance to stress has three stages: alarm, resistance and exhaustion (Griffin and Moorhead 2010, 168). Point 6 can be the exhaustion stage.

Thus, in a DE a change of Ir requires a change of leadership style to influence subordinates in order to maintain unit‘s effectiveness. From the example (figure 11), point 6 has the combination H+S=1 such as 0.3+0.7=1. In this case a commander has to be softer on subordinates, but this may be harder for him, because he has to change his own mental shape (figure 8b). It is a difficult procedure and requires a strong will and understanding of its importance. The mission has to be primary and only after that comes the commander‘s personal ambitions. Energy (H+S=1) at point 6 is still the same with point 4, and a commander will spend energy to change his own mental shape.

Thus, if a commander wants to increase unit effectiveness he can change leadership styles more often in order to keep Lef4. For example, to keep Lef4 > Lef3 he has to change his leadership style more often. Hence, the frequency of fluctuation of leadership styles (Fc4) will be higher than Fc3 (Fc4 > Fc3). To do this a commander has to react more quickly, be open to feedback, monitor the situation, motivate subordinates and create better conditions for satisfaction.

If the environment is constant (Ir = const) the combination of leadership styles (H+S) could also positively influence subordinates who are different, and the commander‘s versatility would refresh and energize them.

Part 2. Method of leading subordinates in a dynamic environment

Changing a leader‘s behavior

The logical understanding of the need to change a leader‘s behavior could force a commander to actually do this in order to make his/her military unit more effective. From the explanation above the author suggests that there are three key points (see figure 12) that describe the leader‘s behavior in a DE.

Point (1)–the moment of growing stress when maintaining the unit‘s effectiveness requires additional efforts or a change in the level of leader‘s power for the subordinates. At this point a commander starts using influence tactics of power with one leadership style. Thus, from point (1) to point (2) a commander uses one leadership style with other leadership tools which provide required unit effectiveness.

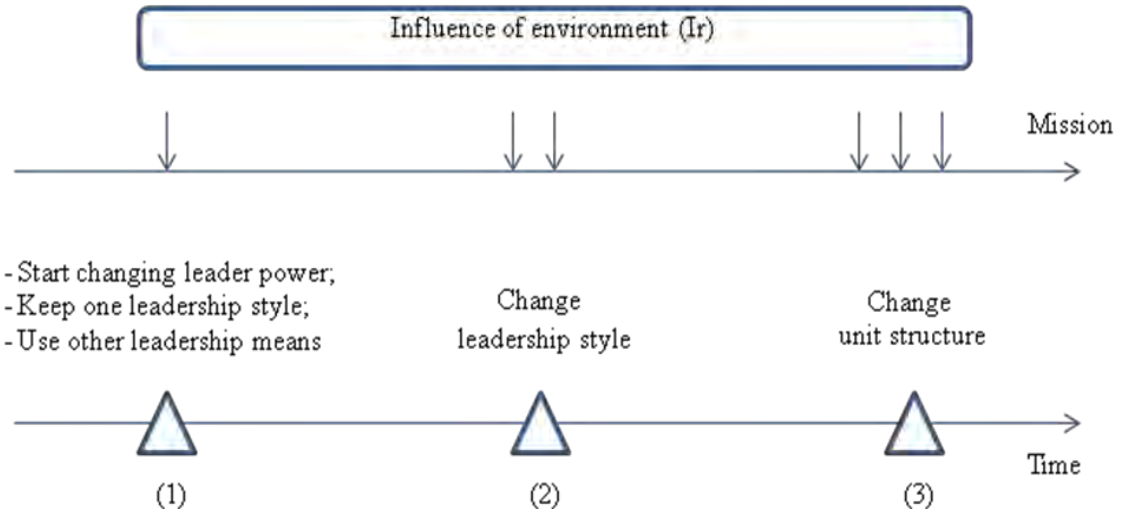

Figure 12. Three key points to lead a military unit
Source: Created by author.

Point (2)–a commander starts changing leadership styles and continues using different influence tactics of power. From point (2) to point (3) a commander has to change leadership styles in order to maintain unit effectiveness.

Point (3)–a commander has to change unit structure in order to endure the strong influence of environment and also to ensure that the military unit remains functional and effective.

A commander can use different leadership tools and keep one leadership style until conditions reach point (2) (see figure 12). At point (2) the old leadership style will not provide the needed unit effectiveness and a commander has to lead subordinates with a combination of different leadership styles until point (3) is achieved. Under growing stress, changing leadership styles cannot maintain unit effectiveness anymore, and the commander has to change the unit‘s structure. People will resist the change, in spite of the fact that the change could be vital to their survival. The commander‘s role is to persuade subordinates how important the change is, create a shared vision and then realize it. Furthermore, if the unit‘s structure does not change a military unit as a system, it could be destroyed by the strong influence of the environment. In this case the system becomes unstable and ineffective. To change the structure could mean to use new weapons, tactics, knowledge, and so on.

Under growing stress, Fs and Fc continue growing and a commander has to change the unit‘s structure because at point (3) the unit will not endure this amount of pressure. So, a military unit can remain functional as long as the commander makes correct decisions.

To prepare a military unit in advance for a change will ensure the unit‘s effectiveness because under growing stress in area Lstro (see figure 2) the unit can become unstable and dysfunctional. A change itself requires a lot of preparation and a certain amount of mental readiness. For a commander to change his/her leadership style may be difficult philosophically. To change a unit‘s structure is difficult physically because of a lot of resistance from subordinates, and misunderstandings with the superior commander may arise. Strict and limited military regulations may also interfere.

The ―Tipping point” is an example of changing an organizational structure in order to make the New York Police Department effective again (Kim and Mauborgne 2003, 60-69). The police commissioner of New York City, William Bratton, in February 1994 had to drastically change the structure of the police department‘s with the establishment of new formats for meetings, using the subway instead of cars and other methods.

Another example of point (3) is the battle between Japanese Samurais and British units in the scene of ―Final battle” of the movie ―The Last Samurai” (YouTube n. d., 12:52) when the British used machine-guns opposite Japanese swords. In spite of high unity, spirit, commitment to their culture and traditions, the Samurais lost the battle because they did not have competitive weapons. This is an example of when changing the leadership style cannot help to endure the influence of the environment.

The commander maintains the unit‘s effectiveness at point (1) with ―influence tactics” of power and other leadership means. Point (1) could correspond to the moment when f‘(y) = 0, where f(y) (see figure 11) is a function which describes system behavior. It is the moment when a commander starts changing leader‘s power first time in order to

maintain unit effectiveness. Also certain Fs with level of subordinates‘ maturity can correspond to a certain leader‘s power (Lp) and define appearance of point (1). Thus, it is possible to suggest that Lp = f (Fs, maturity). People remain effective with one leadership style while Fs < Fsmax; after that they become tired, less effective and require rest.

Maximum frequency of system fluctuation (Fsmax) corresponds to point (2). The difference for any human systems would be only in time of appearance of point (2). Formula 6 explains this. So the system with high Csu can endure the stronger influence of environment and a moment of appearance of point (2) will be later than for the system with low Csu.

At point (2) f‘(x) = 0, where f(x) (see figure 11) is a function which describes the behavior of a unit‘s effectiveness. After point (2) the unit‘s effectiveness will decrease. Fs achieves maximum (Fsmax) at point (2) and the old leadership style does not provide the desired unit‘s effectiveness. Changing a leadership style relaxes subordinates and makes Fs less than Fsmax. It will also maintain or improve the unit‘s effectiveness under condition Fs < Fsmax. When Fs reaches Fsmax the commander has to change the leadership style again.

The commander cannot change leadership styles very often and when Fc achieves Fcmax it will be a time to change the unit‘s structure. It is at point (3).

At points (1) and (2) the system is stable because the commander leads effectively. The area of point (3) is the bifurcation area where the system is the most vulnerable (Veselova, Veselovsky, and Chernavsky 1993, 45-47). The condition of vulnerability is the current Lstr > Lstro (figure 2). There is only one way to keep the

system functional–change the structure in order to provide equilibrium with environmental requirements.

To find Fsmax and Fcmax is important. It is possible to assume that Fsmax is constant for an organization and Fcmax is constant for a person. This assumption has been proven from the position that the human organism in a communication situation is like a "black box," and is measured by the ability of the human brain (Litterer 1969, 315). "The responses to various rates of information input up to and beyond the maximum rate which the system can process, and the ways of adjusting to overloads have been studied for different levels of living systems" (Litterer 1969, 316).

"Theoretical maximum informational channel capacity and over-all performance curves to increasing information input rates were found from experiments on five levels of living systems–cell, organ, organism, groups and organizations." The results of "pulse-interval code" research showed that the information channel capacity is "from about 4000 bits per second for the cell to about 2.5 for the multiechelon organization" (Litterer 1969, 320). Apparently the more components there are in a channel, the lower is its channel capacity. Maximum channel capacity is higher for organizations than for organisms or a person (a commander).

Thus, Fsmax equals about 2.5 bits per second. To achieve this frequency of fluctuation the military unit as a system starts losing effectiveness. "As information input rates to such channels increase, output rates increase, then level off at the channel capacity and then decrease" (Litterer 1969, 321-22).

So Fs max is constant for every organization, and Fc max is constant for every person (Litterer 1969, 320). Fsmax can be explained by the process of the exchange of

information in an organization, and Fcmax has been explained by a human devise to analyze information. For example, with the musical ability to hear something, the human ear has a different diapason than a bird‘s ear. Thus a commander cannot change leadership styles very often because subordinates would not have enough time to analyze the situation and understand him/her.

Thus, the characteristics of a military unit such as Csu (Formula 2), Fs (Formula 8), and Fc (Formula 9) and the expected influence of environment (Ir) can determine points (1), (2), and (3) very precisely. It allows a commander to predict his steps when he has to use influence tactics of power, change leadership styles or change unit structure.

The algorithm of leading subordinates in a dynamic environment

The algorithm (figure 13) explains the method of leading subordinates in a DE. There are conditions for the appearance of points (1), (2), and (3):

(1) $Fs < Fsmax$ and $Fc = 0$, $f'(y) = 0$;

(2) $Fs \geq Fsmax$ and $Fc < Fcmax$, $f'(x) = 0$;

(3) $Fs \geq Fsmax$ and $Fc \geq Fcmax$, $f'(x) = 0$.

Point (1): frequency of fluctuation of the system (Fs) grows and to maintain the unit‘s effectiveness requires using different influence tactics of power with one leadership style (Fc =0). At point (1) a commander starts changing his leader‘s power.

Point (2): frequency of system fluctuation is very high ($Fs \geq Fsmax$) and requires changing leadership styles. At point (2) a commander continues using different influence tactics of power and starts changing leadership styles.

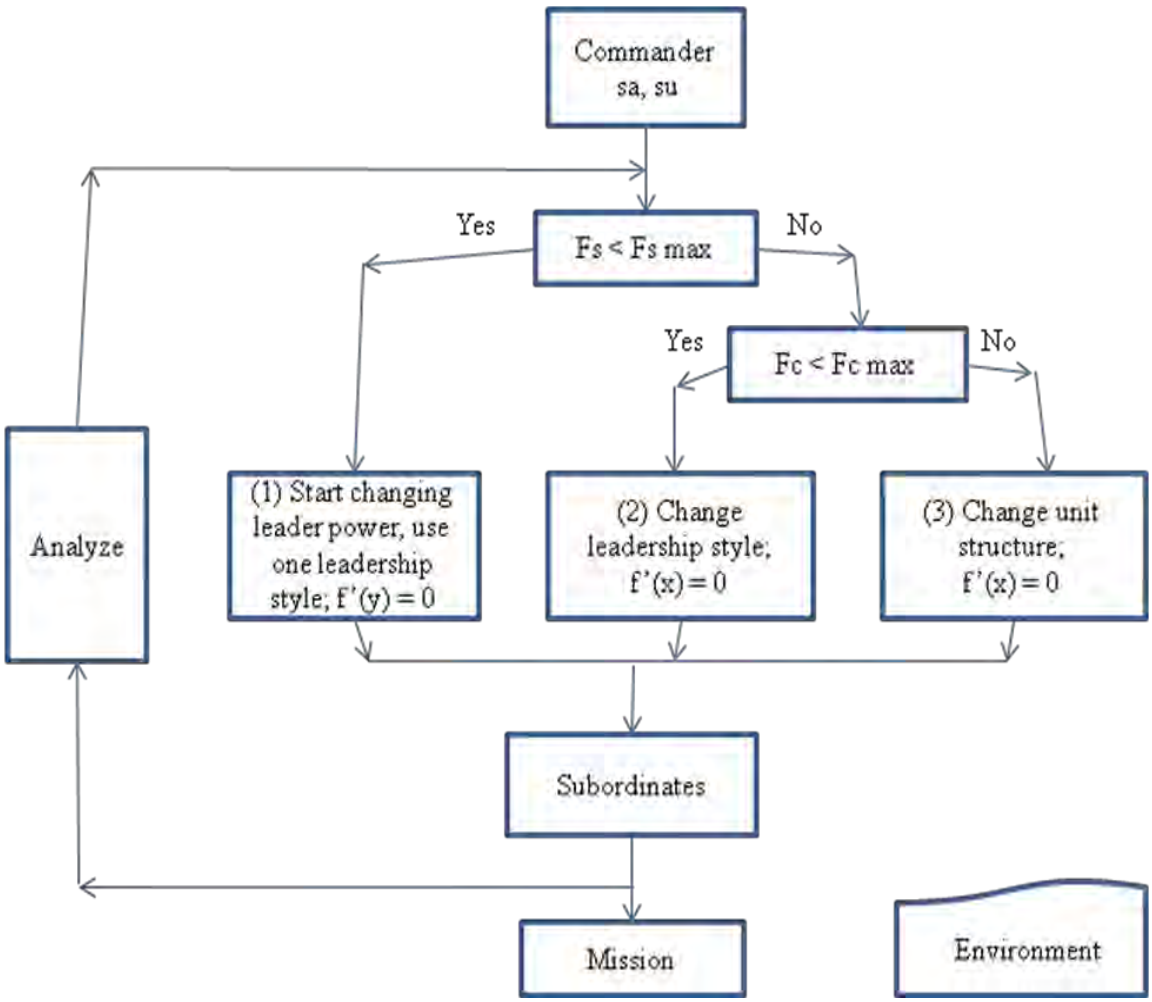

Figure 13. The method of leading subordinates in a dynamic environment
Source: Created by author.

Point (3): changing leadership styles do not maintain unit effectiveness. A commander cannot change leadership style very quickly (Fc = Fcmax). The military unit is unstable, cannot endure the environmental influence (Ir ≥ Lstro) and the unit's effectiveness decreases sharply. The system is vulnerable, and a smaller signal can influence the system much stronger than when a system is in a stable state. The unit can be destroyed or lose its function without changing structure of the unit.

The first order derivation of the function of fluctuation of unit effectiveness or commander behavior defines the appearance of points (2) and (3): f‘(x) = 0. The function of unit (system) behavior defines the appearance of point (1): f‘ (y) = 0.

A military unit has relatively constant characteristics and therefore, the type of behavior which could be described by the function f(x) of time and unit effectiveness. Unit effectiveness stops growing at points where f‘(x) = 0. They are points to change leadership style under condition Ir ≤ Lstro. If Ir > Lstro, then changing styles cannot maintain unit effectiveness anymore, and it is time to change the unit‘s structure.

The unit‘s effectiveness cannot be higher than a certain maximum level (Lefmax) based on the current abilities, skills and knowledge of subordinates. The commander‘s task is to maintain the unit‘s effectiveness as close as possible to Lefmax (see figure 5).

Situational awareness and understanding have to be primary concerns for a commander. They are vital in a DE under the strong influence of the environment.

At point (3) the unit‘s structure must be changed. It could be valuable to start the process of change in advance, for example, after point (2). In a general situation, the order to lead a military unit in a DE is: 1 – 2 – 3 points or levels. This process is possible to do step by step or simultaneously.

If level 1 does not help, a commander can then go to level 2. When level 2 does not provide the required unit‘s effectiveness a commander has to go to level 3. It is possible to lead a unit with level 1 (or 2) and 3 because the unit is effective now and will be ready for the future. In situations where Ir < Lstro, it does not have a sense to change leadership style (level 2) and unit structure (level 3) because it will take more time and energy. It might be enough just to use a different leader‘s power (level 1).

A spiral process of maintaining unit effectiveness

The process of leading subordinates in a DE is a spiral process with new and higher levels (see figure 14). The system cannot go back to a previous state in terms of knowledge, experience, skills, level of satisfaction, motivation, and so on.

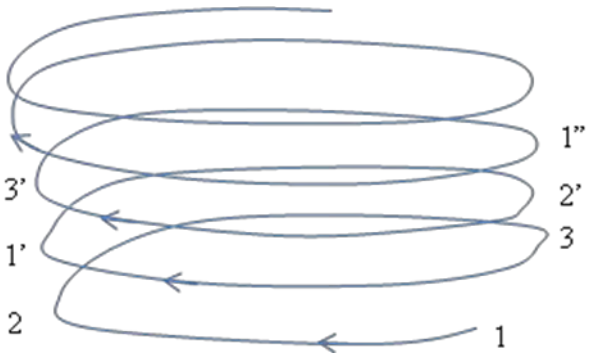

Figure 14. Three points and a periodical process of system development
Source: Created by author.

To achieve point (3) means achieving a new structure. This process requires the participation of subordinates and a shared vision. All three levels require a commander who has high SA, SU and EI. A commander‘s vision is vital because it provides conditions to maintain unit effectiveness and accomplish a mission with the best result.

Changing leadership styles at point (2) or changing the structure at point (3) could decrease stress and keep subordinates safe psychologically and physically secure after combat operations. They will be in their normal comfort zone (see figure 24) and remain production and equal members of society.

Mathematical interpretation of the method of leading subordinates in a DE allows analyzing the past and the current situation in order to predict the future of the military

unit. It gives the opportunity to build the right vision and make the required changes in order to maintain the unit‘s effectiveness in the future.

The method of leading subordinates in a DE (figure13) is possible step by step or also simultaneously. So the commander‘s power and leadership styles can determine unit effectiveness on the first two steps. Under increasing stress it will not suffice and the commander has to create a vision, build shared vision with subordinates and finally change the unit‘s structure as a third step. Communication plays a primary role in order to do these three steps successfully.

Part 3. Putting into practice the method of leading subordinates in a dynamic environment

Communication

A leader‘s power, style and vision play significant roles in leadership, but these are impossible to apply without communication. Klann has stated that ―the more effective the communication, the greater the strength of the bond. Without communication, there is no leadership at all” (2007, 45). To highlight the importance of communication he argues that ―leadership also has three basic laws: communication, communication, communication” (Klann 2007, 40).

To realize a model to lead subordinates in a DE a commander has to communicate with subordinates constantly. The communication channel has to provide freedom for the exchange of information in both directions, from commander to subordinates and from subordinates to commander. There are ―several methods of interpretational communication–written, verbal, and nonverbal signs, attitudes, and body language as

well as communication through actions and appearance" (Klann 2007, 40). They will make a leader effective.

Human psychology and a military unit as a human system prove that communication is the "glue" that connects all organizational things and makes it functional. "Employees need info for both their emotional and psychological security." If they do not get accurate and continuous information from a superior, they will revert to rumors and gossip and to "MSU" (Making Stuff Up) (Klann 2009, 1). A military unit as a human system requires command, feedback, and also control. To do these three things will make the system stable and functional. Thus, the process of exchanging information facilitates change which will improve unit effectiveness by creating dynamic equilibrium with the changing environment.

Feedback, "in its simplest form, can be described as the provision for two-way communication" (Wofford, Gerloff, and Cummins 1977, 49) is a critical element of the algorithm (see figure 13, the block "analyze") which analyzes current situation. The feedback channel has to be constantly opened because without it a military unit as a system will not work properly.

Communication has to correspond to the situation and will be different under increasing stress. Communication as a kind of commander's art plays an extremely important role in a DE. Quick feedback and the commander's reaction will form the required power, style and vision for the commander. Klann recommends to "keep internal and external communication lines open and working so that everyone is informed and they do not have to make up their own stories about the crisis" (2003, 44). Thus, the level

of communication strongly influences unit effectiveness in combat situations because time is critical.

The model to lead subordinates in a DE requires using different power and leadership styles and creates —a culture that will easily transition into and readily adjust to a change situation. The leaders should be trustworthy and authentic. . . . Good change communication begins long before the changes takes place" (Klann 2009, 1).

—Communicated information is the oil and grease that helps an organization operate smoothly" (Klann 2007, 41). To make a change a commander has to build shared vision by regularly sharing information. To do this —leaders at all levels of the organization should follow a rule of three Rs: review, repeat, and reinforce" (Klann 2003, 29). Communication has to establish positive relationships between people and to do this successfully it is important to understand the limits of using leader power.

The limits of power

The author suggests that to describe leadership in its dynamic form it is important to understand limits that a commander should not have to cross. It is possible to imagine a military unit as a box with frames that a commander and subordinates cannot cross physically and mentally because of their duties and opportunities. For example, a private cannot command a captain, and captain cannot command a colonel because of military regulations and culture.

The framework in which to lead subordinates (figure 15) has a field for the commander's authority (C) and a field for the subordinates' ability to work independently (S). A commander and subordinates influence each other. The line of power always shifts. It could be position C1 when a commander uses hard power to lead subordinates or

position S1 when subordinates have more freedom and can influence a commander. A commander can also create the right conditions to motivate and satisfy subordinates.

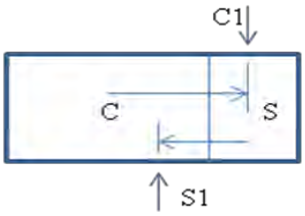

Figure 15. The framework of leading subordinates
Source: Created by author.

Relationships among a commander and subordinates are located between two restricted boundaries. One of them called the ―boundary of explosion" (Boe) (see figure 16a), another one called the ―boundary of losing power" (see figure 16b).

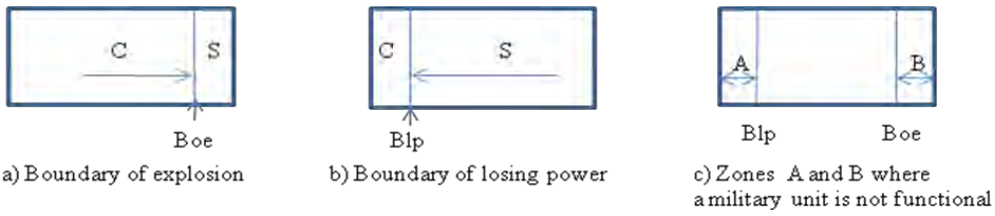

Figure 16. The frameworks of leading subordinates
Source: Created by author.

Boe is a level of commander's power which corresponds to the minimum level of subordinates' independence (Limin) when a military unit is still functional. Boe can be different for different people and depends on the culture of the country and an organization, motivation, and personal traits. Thus, Boe is the maximum level of

subordinate dependence which still allows controlling subordinates. Boe is a boundary when a person or a human system becomes unstable. After crossing Boe it would be very difficult or perhaps impossible to return to the previous situation in the group or restore relationships with the subordinates. Furthermore, conflicts may become permanent, and a commander and a subordinate can stay enemies forever.

The other side of the box has a boundary called ―boundary of losing power" (Blp) (see figure 16b). A military unit becomes unmanageable and not functional after crossing this line because a commander loses control of the situation. Blp corresponds to the maximum level of independence (Limax) that is possible to give to subordinates and still control them.

Restricted boundaries such as Boe and Blp define zones "A" and "B" (see figure 16c) in which a military unit is ineffective and unstable. This interpretation of the relationship between a commander and subordinates will help to better understand what a commander has to do in different complicated situations, especially in a combat situation, and how to choose an appropriate level of leader power and leadership style.

A leader's power and leadership styles

Leadership styles are a set of tools to lead subordinates. A commander has to know these tools and use them carefully in order to not damage the subordinates' and the commander's reputation. An appropriate leadership style at the right time gives very positive results, and the wrong style could decrease or completely destroy potentially vulnerable and tentative relationships between a commander and subordinates. To build is more difficult than to destroy, and therefore we could compare leadership tools with the tools of a surgeon.

Influence tactics of power is possible to see as a tactical hand tool to lead subordinates and leadership styles as a tool at the operational level. Using both tools provides more accurate and effective leadership. One leadership style may be combined with different influence tactics of power which allow polishing the product and achieving the desired goal. In spite of this the leadership chosen style should play the primary role.

It will be more visual to see the process of shifting of leadership styles in the "box" (see figure 15) in order to maintain a military unit at a functional level. There is a movement from Boe to the Blp in these boundaries that the commander can use his power tool kit. Power includes position and personal power (Klann 2010, 64). Klann has described "influence tactics." There are hard, soft and rational tactics (Klann 2010, 67-70). These tactics work with leadership styles and usually correspond to certain leadership styles. The emotional intelligence of a commander defines the moment when to use the required influence tactic or leadership style.

There are leadership styles which provide effective leadership. Goleman has defined some styles to obtain a commitment: authoritative, affiliative, democratic, coaching and some styles to get compliance: pacesetting and coercive (2000, 78).

Thus, a commander can use personal power to get commitment and use positional power to get compliance. Leadership styles may be used to get commitment and compliance also. Therefore we can assume that leadership styles could be based on the more fundamental definitions of position and personal power.

"The application of influence tactics of power is also demonstrated through one's leadership style" (Klann 2010, 72). It is important to understand the difference between leadership styles and influence tactics of power.

So a commander can lead subordinates with one style but use different influence tactics of power to maintain unit effectiveness until it stops increasing. At this point influence tactics of power may stop working because the leadership style is already not an appropriate one.

Influence tactics of power and leadership styles have a direct connection. In the situational leadership model there are four styles which are dependent on the followers' readiness or maturity (Hughes, Ginnett, and Curphy 2006, 369). These styles are delegating, participating, selling and telling. All these styles are defined by levels of task and relationship behaviors.

The "participating" style is characterized by high relationship behaviors and low task behaviors. A high level of relationships can be achieved by using personal power to get commitment. To get commitment requires a change in thinking. It is better to do this with soft influencing techniques which can persuade subordinates more quickly. Moreover, using hard influencing techniques, which is close to the Boe in the "box" (see figure 16a) may destroy the leader's relationship with subordinates.

Some examples of changing leadership styles

A commander should change his leadership style when a previous style becomes ineffective. Under growing stress and unfavorable conditions a subordinate will become tired from being under stress, but the mission must be accomplished. In this case the way to influence him might be friendly conversation, persuasion, not giving an order, or maybe giving an order and forcing him to do something.

Another example of using hard power might be that the subordinates do not have any strength to run further. The commander can tell them in a strong, but friendly way

that they must running, and we will do this together. One more example of using soft power would be to force a subordinate to continue to do his job by making him more participative and less controlled.

Some commanders can change their behavior quickly. They can shout and then become friendly and speak politely after a few minutes. From the author‘s observations it appears that high - ranking commanders have the ability to switch their behavior quicker than other officers. This means that they can better maintain unit effectiveness under stress.

If unit effectiveness stops growing or decreases it means that the current leadership style is ineffective. To improve the situation a commander should use another leadership style, make people more comfortable, do not coerce them and give them more independence. A commander becomes softer and gives subordinates part of his authority. He does this in order to accept subordinates‘ requirements for maintaining the unit‘s effectiveness.

If a commander, for example, changes a hard leadership style to a soft style, this means that he trusts subordinates more than before. In a combat situation a strict commander becomes closer to the subordinates and might say: ―believe you, we will win!”

To prove the need for changing a leadership style it is important to understand that under stress, maturity, cohesion, and spirit as the effect of synergy can be changed and increased. Synergy is ―joint working . . . combined or correlated action of a group . . . increased effectiveness, achievements, etc., produced as a result of combined action or cooperation” (Simpson and Weiner 1989, 480).

People under stress become closer to each other. This may be a second reason why the strict commander often becomes soft and polite under strong stress. The soft style will not work later and with a hard style a commander should force subordinates to proceed. The commander's previous softness decreases stress for the subordinates, and they return to the previous feeling (level of cohesion, for instance). The effect of synergy will decrease also.

Coercive power usually achieves compliance. A commander might use a hard style to increase unit cohesion. A good example of increasing team's unity under stress is in the scene "Again, Again, Again" in the movie "Miracle" (YouTube n.d., 7:52). In 1980, the United States Ice Hockey team's coach, Herb Brooks, decides to create stress artificially by his coercive positional power by increasing sharply training for players in order to improve the team's cohesion before the decisive game.

Another example of the synergy effect is a penal battalion during the WWII in the Red Army. The soviet movie "Iga" (1989) by director Vilen Novak and the Russian movie "Shtrafbat" (2004) by director Nikolai Dostal show these penal battalions. They included officers and soldiers who had committed crimes and did not display any cohesion and morale, but under stress these qualities started to increase sharply and created a strong spirit, morale, and cohesion.

The synergy effect also influences the group's IQ. Goleman suggests that groups fall into one of three performance levels. At the worst, frictions within the group make it fail as a team, with performance that is poorer than the average individual score. When the team works reasonably well, the group score will be greater than the average individual score. But when the team has real synergy, its score far exceeds even the best

individual score" (1998, 204-05). Thus, the synergy effect increases the unit's IQ and hence influences the maturity of subordinates. Changing of maturity or confidence of subordinates with statements of the Situational Leadership Model proves that a commander has to change leadership styles in order to maintain unit effectiveness (Hersey 1984, 69).

Another example of the synergy effect is life in Alaska. Residents of Alaska in comparison with residents of other American states are more ready to aid each other because of the harsh northern climate that has enhanced their camaraderie, bonding and unity.

So, we can see that under stress human qualities can change very quickly. As a result of it, according to the Situational Leadership Model (Hughes, Ginnett, and Curphy 2006, 369), changing of maturity means that a leader has to change his style. It might be one of the explanations of the reason for a leader changing his/her leadership style.

Another leadership contingency theory is the contingency model which "suggests that leader effectiveness is primarily determined by selecting the right kind of leader for a certain situation or changing the situation to fit the particular leader's style" (Hughes, Ginnett, and Curphy 2006, 372-73). This theory shows that a leadership style and the situation have to correspond with each other. A new situation requires a new leadership style. Under increasing stress changing the situation would be more difficult than changing the leadership style.

The third contingency leadership theory, the Path-Goal Theory, defines four leader behaviors: directive, supportive, participative and achievement-oriented leadership

(Hughes, Ginnett, and Curphy 2006, 378-81). This theory also proves the need of changing leadership styles in a DE in order to maintain unit effectiveness.

Thus, under stress, characteristics of subordinates can change very quickly in comparison with a routine situation. This process requires monitoring the situation and changing leadership styles.

An example of soft power and enhancing friendly relationships between a commander and subordinates is ―caring and connecting as preparation for crisis" (Klann 2003, 37). He recommends that ―leader can demonstrate caring and genuine concern for the emotional well-being of direct reports to include, but not limited to, the following: greet people by name; maintain and display a positive, optimistic, upbeat attitude; smile at and shake hands with employees; say ―thank you" for a job well done and use specific examples when complimenting individuals on performance; follow through on promises; be patient."

The commander's role is enormous. He should have a good level of situational awareness and situational understanding. In other words, this means both understanding subordinates and understanding the situation. ―Leaders who understand the connection between emotion and behavior will be more effective during a crisis because they will understand how to meet the needs of people in the organization and so influence their behavior (Klann 2003, 42). These leaders get quick feedback and spend less time to making a decision (ΔTc). As a result of this he will be able to react in time and maintain unit effectiveness or increase it in spite of the stress.

Morale, pride and spirit play the key roles in leading subordinates in a DE, because these team qualities could help them to endure stress and maintain unit

effectiveness. —When morale, pride, and spirit are enhanced, there is a positive response of cooperation and loyalty from team members toward the leader, the team, and the organization" (Klann 2004, 6).

Procedure to lead subordinates effectively

To change one's leadership style is a mentally difficult process, because it strongly depends on the commander's personal traits and experience. Secondly, it is hard to recognize the moment when the leader should change his power, style and organizational structure. Thus, an explanation of the procedures to lead subordinates in a DE entails two essential questions: why and when a commander has to change leadership power and styles.

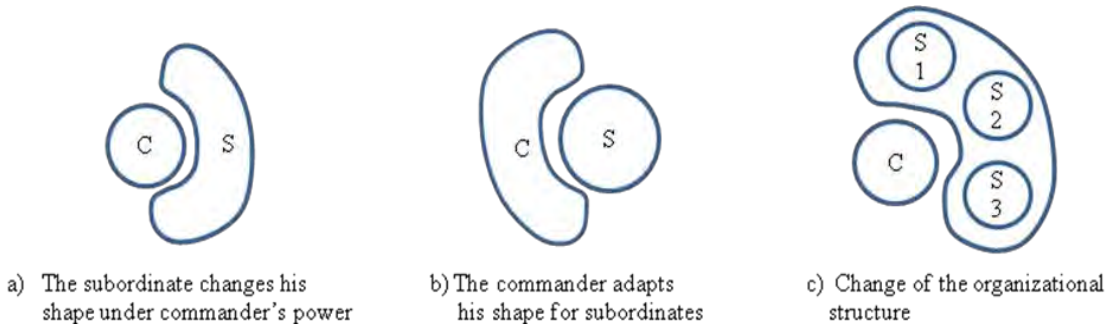

Figure 17. Procedure to lead subordinates effectively
Source: Created by author.

Point (1) (see figure 12) shows the moment when to use different influence tactics of power with one leadership style in order to maintain the unit's effectiveness under increasing stress. The situation is normal with moderate Ir and the commander forces subordinates to carry out their duties with one leadership style and influences their

behavior (mental shape) or squeezes them (see figure17a) with influence tactics of power by giving them more tasks and increased requirements. But the commander does not have to cross the Boe in this process (see figure 16a).

Point (2) (see figure 12) is a critical point when the unit‘s effectiveness stops increasing. A commander has to recognize this as soon as possible with his situational awareness and situational understanding. After point (2) a commander has to use another leadership style, because the previous one is not effective. A commander changes his leadership style with his mental shape (see figure 17b). He becomes softer (or harder). Blp and Boe (see figure 16) limit him because he can lose control of the situation.

Under the growing stress on a certain level of the commander‘s fluctuation (Fcmax) a military unit may become unmanageable because subordinates will not react to the change in leadership style. It is point (3) (see figure 12) when a commander has to change an organizational structure in order to adapt the system for modern requirements and make it effective again. A new structure might mean new weapons, technology, tactics and so on. For example, MRAP is a kind of a structural change because it provides higher security for soldiers and maintains unit effectiveness. Changing unit structure requires a high degree of cooperation and equal participation of all members of a military unit on the basis of a shared vision (figure 17c). Vision is essential to implement a change.

Realization of vision

Change itself has to be prepared in mind of subordinates. Vision as ―a realistic, credible, attractive future for your organization" implements this preparation and ―plus

an important role not only in the start-up phase of an organization but throughout the organization's entire life cycle" (Nanus 1992, 8-9).

"New insights fail to get put into practice because they conflict with deeply held internal images of how the world works, images that limit us to familiar ways of thinking and acting" (Senge 2006, 163).

Every organization has its mental model. The system has to be open and equilibrium with the environment. To open a system could be dangerous because this makes it complicated to manage the system and predict its movement. The task is to save the positive functions of the system and adapt them for current requirements. Vision is a "mental bridge" between the old state and the new one and can maintain the functionality of a system functional. A team of experts with knowledge and vision has to build the transitional bridges (see figure 19).

A human system is complicated and inertial and a process of change will take time. Vision can allow this process to start earlier in order to prepare a system for future challenges. This endless process has character of dynamic equilibrium because "change itself can be a condition of equilibrium" (Albrecht 1978, 93-95). The system may be in a stable state as long as the environment does not change. If the environment starts changing, a team of experts has to maintain this equilibrium by providing required changes.

"The Shell and BP stories suggest three facets to developing an organization's capacity to surface and test mental models: tools that promote personal awareness and reflective skills, 'infrastructures' that try to institutionalize regular practice with mental models, and a culture that promotes inquiry and challenging our thinking . . . In the

traditional authoritarian organization, the dogma was managing, organizing, and controlling,‘ says Hanover‘s CEO Bill O‘Brien. _In thelearning, the new _dogma‘ will be vision, values, and mental models. The healthy corporations will be ones which can systematize ways to bring people together to develop the best possible mental models for facing any situation at hand’”(Senge 2006, 171).

The role of a leader is crucial in creating vision, values, and a mental model for an organization. The commander‘s vision can be realized by providing values and a mental model of the military unit. Subordinates have to go on the bridge, and not turn left or right. A military unit is open and vulnerable during the transition phase and a small exterior signal can change the planning unit‘s direction. A commander can influence a unit with a small signal also in order to maintain a unit on the bridge of vision.

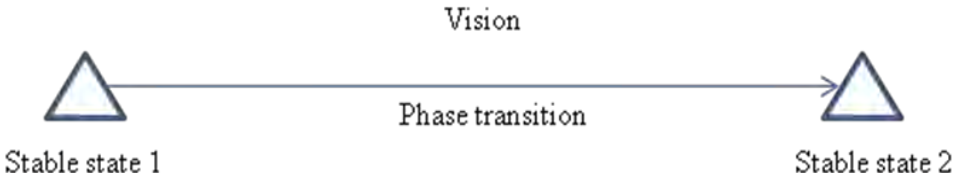

Figure 18. Phase transition

Source: Created by author.

That is why during the phase transition the commander‘s role could be just to direct a unit and monitor the situation. He should not use a lot of power because at this time the level of independence of the subordinates is high, and a unit as a system is open. It provides conditions to build a shared vision and make everyone participative in the process of change. —Genuine caring about a shared vision is rooted in personal visions”

(Senge 2006, 197). A commander's vision has to be the right vision which "attracts commitment and energizes people; creates meaning in workers' lives; establishes a standard of excellence; and bridges the present and future" (Nanus 1992, 16-17).

If a commander provides conditions for institutionalizing a practice he will build a "bridge's team" which has to work constantly. If a commander decreases phase transitions which are ranges between points of stable states by constant feedback the transition would not be so vulnerable and painful.

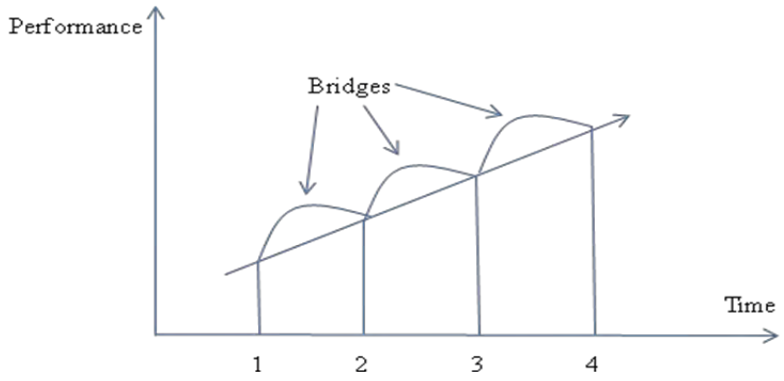

Figure 19. Bridges of transition

Source: Created by author.

Points 1, 2, 3, and 4 are points of stable states (see figure 19) with increasing levels of performance. The time between these points could be a day, a month or years.

"The structures that characterize personal mastery as a discipline are: creative tension, emotional tension, and structural conflict. The systems perspective also illuminates subtler aspects of personal mastery–especially integrating reason and intuition; continually seeing more our connectedness to the world; compassion; and commitment to the whole" (Senge 2006, 156).

Human behavior is similar with the behavior of biophysical system which looks for the shortest way for adaptation to new requirements with minimum losses of energy. According to the law of synergy a system will go to another state by changing the structure with minimum energy losses. Also a nonlinear system may go to another state with a new structure by leaps and bounds (Kapitsa, Kurdyumov, and Malinetskii 2003, 55). It explains an appearance of a structural conflict.

To develop an organization and keep it functional is difficult. To do this it is possible to see two lines: the functional line which keeps the unit functional and the development line (see figure 20). A commander and subordinates build the development line.

Development means a new organization with a new structure. The structure could be new weapons, equipment, tactic and so on. Function means to maintain the same function–to defense the country, not to produce cars.

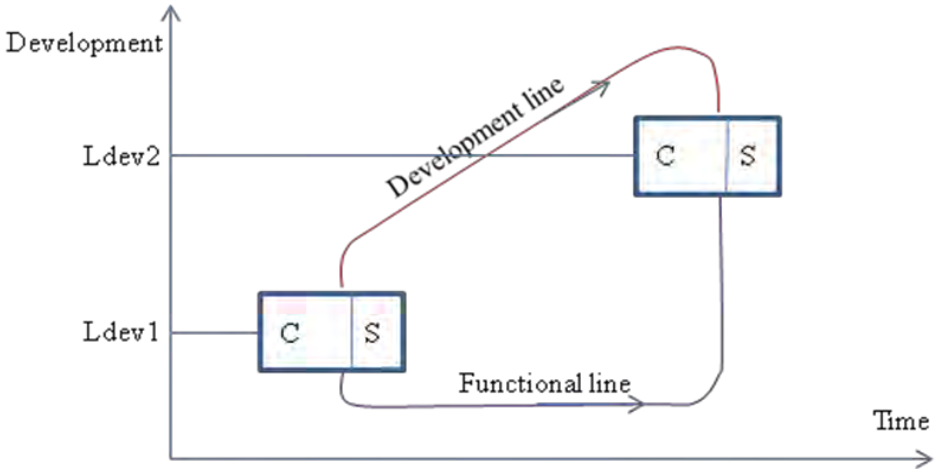

Figure 20. Development and function lines of the organization
Source: Created by author.

The development line of a military unit should be open (exchange of innovations, feedback, and so on). The commander‘s role is to maintain a military unit in a stable state with high readiness on the one hand and make it flexible and adaptive on the other hand with the principles of a learning organization. These two lines are important because the functional line provides the constant ability to work or have combat readiness. The development line is a mechanism of quick reaction and the unit‘s adaptation for changes as well as propositions for development, generation of innovations and their input.

The development line requires a certain level of freedom or level of independence in the military unit, because it is possible to get perfect feedback only from subordinates‘ real questions. These can appear only in an atmosphere of freedom. So, an open system can facilitate the exchange of information between a military unit and the environment. Under these conditions a military unit can develop a special positive culture or a ―mental model” in the unit which maintains functions or combat readiness and effectiveness.

Thus, in a modern DE with rapid developing science, weapons, technology, and equipment, the role of leadership becomes more important than ever. This requires a new type of commander with a high level of flexibility, creativity, ability for adaptation and resilience as well.

Flexibility, creativity and adaptability will facilitate building of a development line, and resilience will maintain a stable military unit. A development line supports a commander‘s vision. A military unit is still in a previous stable state when mentally the subordinates have already made a step ahead. So, a development line provides conditions to make this step practical without any loss of effectiveness or functionality of a military unit.

A commander‘s vision transforms to a shared vision and prepares a military unit for transition to a new stable state. He has to have high situational awareness and situational understanding in order to lead subordinates according to his vision. Subordinates can influence a development line by the unit‘s culture and climate. The triangle of culture, climate and environment has to be in balance. Balance might be maintained by changing or adaptation of culture and climate. It is a normal process of adaptation for every human system, which is a self-regulated system. Equilibrium between a unit and the environment is the condition for the balance. The task is to create a dynamic equilibrium with environment. The ability of a military unit to do this will provide constant stability and make a military unit effective.

A change always meets resistance. People resist changes because they fear a loss of identity or social contacts, but a positive plan for change can decrease resistance. Change has to ripen and the force for change has to be stronger than the resistance force. In this case the system will lose stability and will jump to another level of performance with a new structure.

The phase transition (see figure 18) includes –four reactions to change–shock, anger, rejection, and acceptance–make up what is known as the SARA model (Kubler-Ross, 1981)” (Hughes, Ginnett, and Curphy 2006, 401).

To fight resistance requires certain traits and skills for a commander. So, —charismatic leaders are passionate, driven individuals who are able to paint a compelling vision of the future. Through this vision they are able to generate high levels of excitement among followers and build particularly strong emotional attachments with them. The combination of a compelling vision, heightened emotional levels, and strong

personal attachments often compel followers to put forth greater effort to meet organizational or societal challenges" (Hughes, Ginnett, and Curphy 2006, 405).

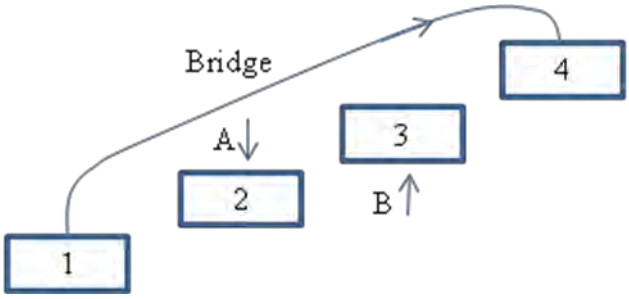

Figure 21. Transition stages

Source: Created by author.

During phase transition the biggest problem is to maintain an effective military unit. Therefore, vision can save unit effectiveness. For example, if signal A and B (see figure 21) will influence the military unit in the future it is important to adapt the unit to them in advance. To do this it is possible to use some transition states as (2) and (3) (see figure 21) on the way to the next stable state. They could help avoid the destruction of the system (1) during the long phase transition to state (4).

A short bridge makes a military unit more secure in comparison with a long one. Therefore, strategic or a long vision can include a short vision that could be more understandable for subordinates in order to build a shared vision with them. Personal visions should transform into shared visions (Senge 2006, 197). A commander has to manage a mental model of a military unit in order to create shared vision and implement a structural change.

Changing unit structure

Equilibrium with the environment is a condition for a military unit to stay functional. This principle makes a military unit similar to a learning organization. ―Equibrium within a human system does not necessary mean a complete lack of change. Change itself can be a condition of equilibrium" (Albercht 1978, 95). Communication is decisive in order to maintain a dynamic equilibrium.

The system resists any changes. In order to adapt a military unit for future challenges a commander can do it artificially in advance. The condition for change according to Beer (1988, 1999): C = D x M x P > R (10) where D–followers' dissatisfaction; M–model for change; P–process; R–resistance; C–amount of change (Hughes, Ginnett, and Curphy 2006, 394).

Also, the condition for change could be that C = Ir + Ii > R, where Ir–influence of environment or exterior force, Ii–interior force. The conditions could be fine, but the strong influence of environment such as combat situation, may require change even though Ii is constant and less then R. To make a change in advance a commander can use interior (Ii) and exterior (Ir) forces for a change.

If the human system does not respond to new requirements it would be ineffective or completely destroyed. To change a unit's structure in advance is vital. This process takes time because of human resistance and cultural and mental inertia. To change a structure at a critical point is dangerous because the system can lose its function.

Ii > R means that a commander persuaded subordinates and build a shared vision to change a nit's structure. ―Il' is a tool for a commander and Ir is an indicator for the commander which defines time for a change.

Subordinates‘ behavior and the situation can be more favorable or less favorable in order to accomplish a mission. Subordinates may also have more desirable or less desirable behavior. The more desirable behavior is limited by the subordinates‘ skills, knowledge, and natural human abilities. The worst case occurs when the behavior of subordinates and the situation are not favorable. Constant monitoring of the situation with the use of all leadership tools maintains unit effectiveness.

There are two boundaries, Lef max and Lef min (see figure 22), where a military unit is functional. At point T1 the favorable situation increases subordinates‘ effectiveness (Lef1) even though subordinates do not show the Lef max in this point. At point T2 the situation is less favorable and decreases subordinates‘ effectiveness (Lef2). At point T3 the situation is completely unfavorable (Ir > Ir max) and a military unit is not effective Lef3 < Lefmin. It means that the mission cannot be accomplished.

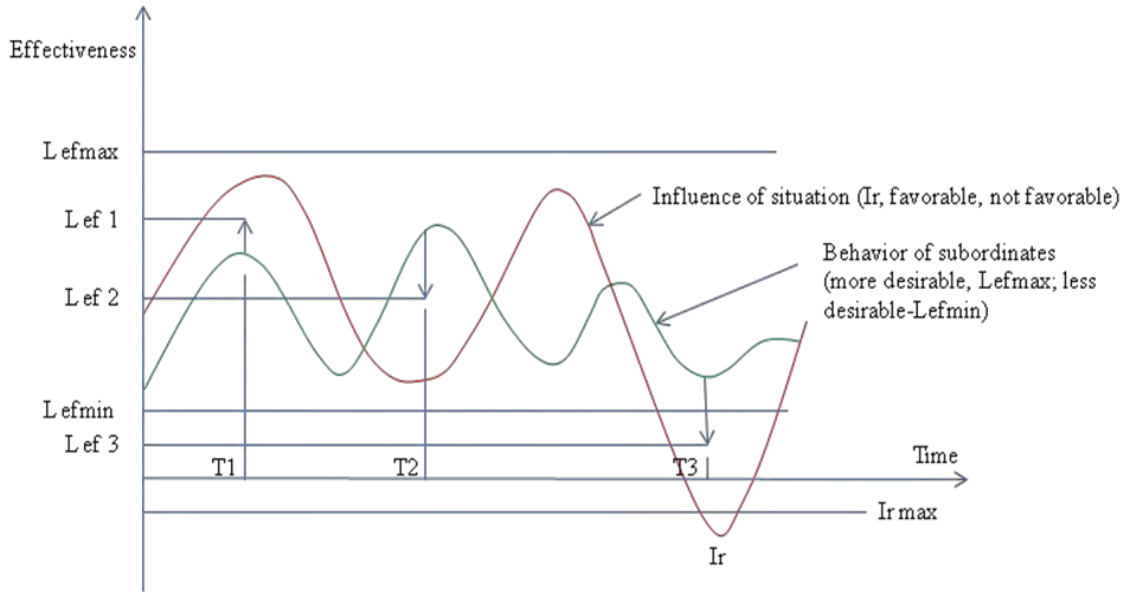

Figure 22. Influence of situation on subordinates‘ effectiveness
Source: Created by author.

Ir max is a certain level of environmental influence which makes the system unstable. Under condition Ir ≥ Irmax (Lstro) a military unit is not effective in spite of change of the commander‘s power and style. At this point the unstable system goes into phase transition in order to change the structure at the bifurcation point (see figure 2) and acquire a new stable state which responds to new requirements.

To solve this problem a commander has to change a unit‘s structure in advance. The method of leading subordinates in a DE on the basis of Fs (formula 8) and Fc (formula 9) can predict the moment in which to make a certain change.

In phase transition, especially in the bifurcation area the system is more sensitive (Veselova, Veselovsky, and Chernavsky 1993, 45-47) and vulnerable. The commander‘s role is to make the phase transition shorter in order to secure the unit‘s effectiveness.

Naturally in conditions when Ir > Ir max a commander can use soft power and leadership styles to get a commitment. This helps a commander to build a shared vision and become equal with or friendly soft to his subordinates (see figure 16b). Under these conditions no communication barriers exist, feedback is quick, and resistance to change is small (C > R). These conditions decrease phase transition and, hence, makes a military unit highly adaptive, survivable and effective. To deal with a change it is important to understand the nature of personal resilience and limitation to train it.

Resilience, stress reduction and training focus

Personal resilience plays one of the primary roles for the military in order to accomplish a mission successfully in a DE. But constant resilience training can affect a soldier in a negative way. This part of chapter 4 explains the limits of resilience training and guides commanders to train for resilience carefully and selectively.

Resilience is a personal trait of enduring the influence of the environment in order to accomplish a task. A lot of authors and commanders see increasing resilience as only a positive action and recommend as much resilience training as possible because it might improve one‘s ability to realize desired goals through life challenges. ―Resilience enables you to achieve at the highest levels at work, to have fulfilling, loving relationships. . . . Resilience is of vital importance when making quick and tough decisions in moment of chaos” (Reivich and Shatte 2002, 4).

Without any doubt increasing resilience is a useful process for everyone. But the consequences of training for resilience with people who work under high stress or low stress are different. Military personnel stay under high stress more often and train for resilience every day because of the specifics of their job. Working close to the edge of human resilience in conditions of a DE requires studying and analyzing the limitations of resilience training.

Crossing a certain resilience threshold can create conditions when a soldier does not feel comfortable in a civilian environment anymore and seeks more challenges again. Resilience training requires a cautious and individual approach for everyone.

From a biophysical point of view a person or group of people is an open biophysical system. In this case resilience is a human reaction to the influence of the environment in order to keep this system stable and functional.

The Yerkes-Dodson Law (Yerkes and Dodson1908, 459-82) can help to analyze human behavior under stress (see figure 23). This law ―basically suggests that as stress increases, so does performance but only up to a certain point. After that point, a further

increase of stress results in a decline in performance" (McCollum and Broaddus 2009, 249).

Stress is a result of natural personal protection. Everyone has sensitivity (Sen) and resilience (Res). The more sensitive person reacts to danger earlier than the less sensitive one. Thus, stress will start earlier for this person with high sensitivity and low resilience.

Stress always exists and can never be zero, because it is a part of life as a reaction to an exterior signal. Therefore, it is possible to assume that a minimum level of stress always exists - - Lstr min (see figure 24). It is the moment when a person is born (or is inside of the mother's womb).

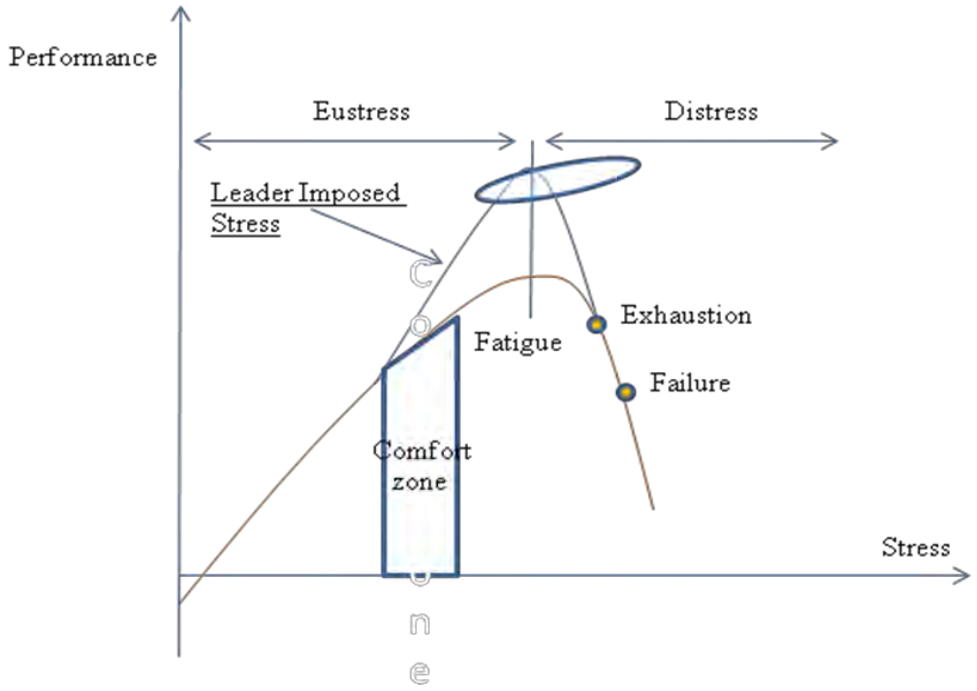

Figure 23. Halo of Excellence
Source: Bill McCollum and Matthew Broaddus, "Leader-imposed stress in organization: do you improve your organization, or detract from its success?" 2009, in L100 *Developing Organizations and Leaders* (Fort Leavenworth, KS: US Army Command and General Staff College, August 2010), 250

The —Halo of Excellence" (figure 23) explains the process of improving human physical or cognitive abilities. Once a person has achieved maximum performance in something (for instance, the best time or results for an athlete), he may later exceed this result, and it will become a new maximum performance level. So, personal performance, (Perf.max 1) will increase to Perf.max 2 (see figure 24).

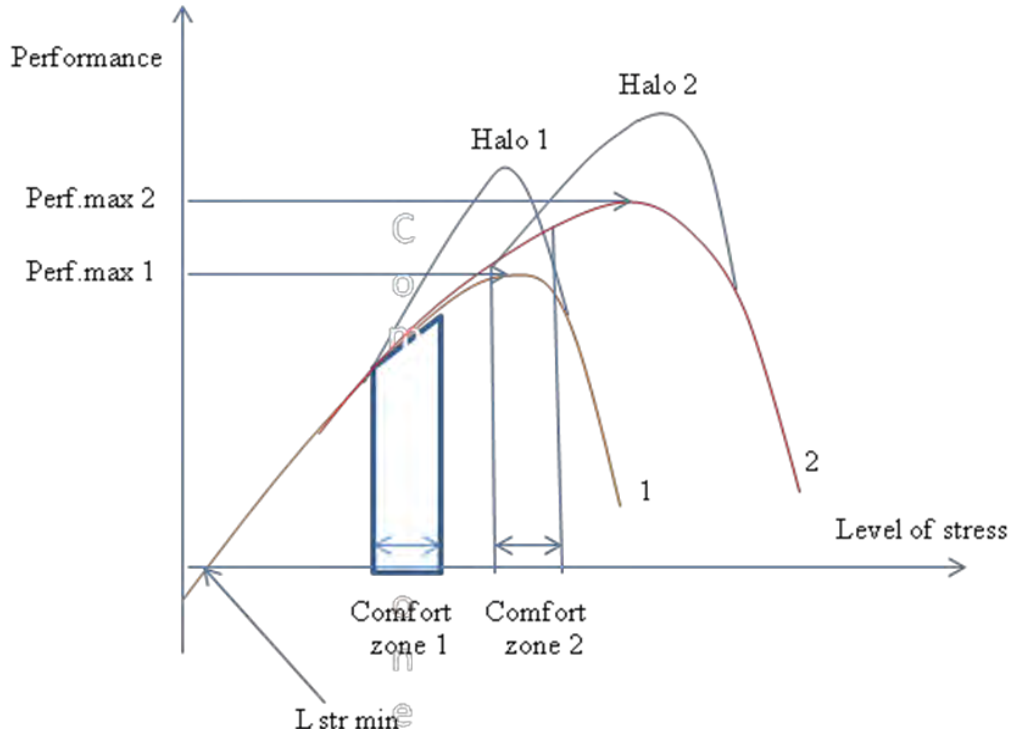

Figure 24. The —Halo of Excellence" with a shifting —Comfort zone" during training
Source: Created by author on the basis of figure 23.

For the level of Perf.max 2, the resilience of the person is higher than for Perf.max1, because the person now already can endure a higher level of stress than before. For instance, the athlete can withstand more stress than before and win a competition. Two different level of stress (Lstr1 and Lstr2) correspond to Perf.max 1 and

Perf.max 2. Graph 1 will move to the position of graph 2 (see figure 24). Therefore, —Comfort zone 1" will shift to position 2 where the level of stress is high (Lstr2 > Lstr1). Thus, the person now requires higher stress in order to feel good or to be in the –comfort zone."

The —Halo of Excellence" describes both the soldier and the athlete when they train for endurance, resilience and move to the right on the graph to a more stressful (see figure 24) and dangerous environment. Therefore, resilience also grows as a response to increased stress. But a boundary exists where the situation can become really unsafe.

From a biophysical point of view if the influence force grows, a person will not be able to endure this. It is the last point - Lstro (see figure 2)-that a human system becomes unstable. At the point Lstro a person has the maximum resilience Rstro (see figure 2), which still allows him to maintain stability. Therefore, a commander has to know this and be careful when doing resilience training (Rtr). A lot of athletes in sports such as wrestling or boxing increase their Rtr, cross Rstro, and are injured to varying degrees.

According to the —Halo of Excellence" a person can improve cognitive abilities and hence emotional intelligence (EI) as well. A high level of EI will make it easier to solve problems. People like following a person with both high Res and EI. Resilience can be improved by using the effect of the —Halo of Excellence" in the area of —Eustress" (see figure 23).

The active duty or retired soldier and athlete differ from civilians because they have different –comfort zones." It is not so easy for them to feel comfortable in a civilian environment or civilian –comfort zone." A lot of retired military cannot find themselves in civilian environment. They may seek challenges and dangerous situations again or at

least stay in a military or similar environment. Military personnel that come back from a war zone have the same problem. They have trained their resilience in order to endure combat stress, so their resilience is high. Moreover, different levels of resilience may be one of the causes of conflict between young and older soldiers and officers in a military unit.

Retired military, veterans of war, and athletes may start to drink alcohol in order to release stress and return to their previous or civilian "comfort zone." For some of them who are not far from the civilian "comfort zone" it is possible to return to a civilian environment. But for a lot of military the return to previous levels of resilience or their "comfort zone" may be impossible because they had stress equal to their personal Lstro (see figure 2) after which the human system, as a biophysical system, goes into phase transition and becomes unstable (Gitterman and Halpern 2006, 16-19).

Examples of this occur when retired military look for dangerous jobs such as with the contractor KBR in Iraq or Afghanistan. For them it looks like there is only one way to go ahead - to danger. This reminds us of a situation in which a human system does not have balance and is not in a stable state. The "Halo of Excellence" explains the procedure of training a human brain. But a boundary also exists when the person becomes very unstable.

In spite of all this above, to achieve the "Halo" may also mean success. Stress can also have positive characteristics. The educational process can be an example of positive stress (eustress). A student has to push or strain himself in order to acquire some knowledge and improve his cognitive level. Stress in education is an example that shows how rest is important to achieve high performance. A commander should also know this

and give his subordinates time for rest. The timing of the rest is important because performance can stop increasing. Resilience training should be individualized. A person with high resilience can achieve high performance and job advancement.

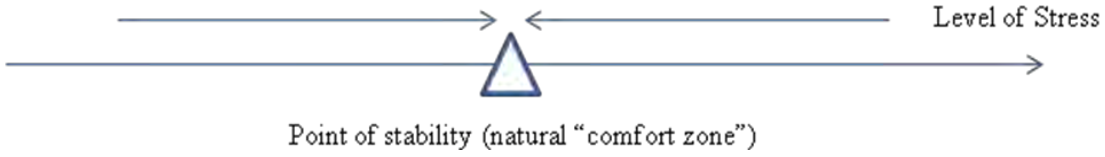

Figure 25. Point of stability (natural "comfort zone")
Source: Created by author.

A person likes to return to his natural "comfort zone," which he has had since he was born. This natural zone corresponds to his psychological type and maintains him in a balanced and stable state. Every system goes back to its stable point or natural "comfort zone" (see figure 25). In order to return to this point a person uses different tools. They sing a song, laugh, go fishing, play games like children, and so on (Klann 2003, 81). In cases of stress alcohol might be also a tool.

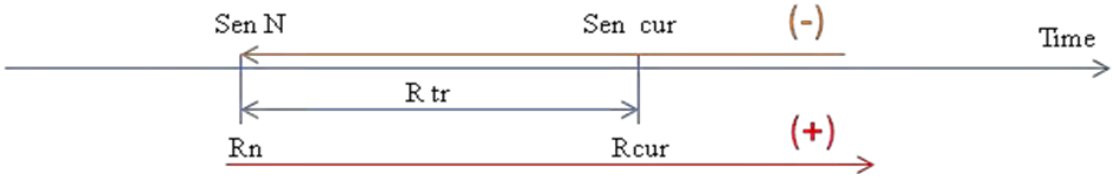

Figure 26. Personal sensitivity and resilience
Source: Created by author.

Resilience training means increasing the ability to endure high stress. Simultaneously, a person will also decrease his/her sensitivity. Figure 26 shows this connection. There are: Sen N is natural sensitivity; Sen cur is current sensitivity; Rcur = Rn + Rtr is current resilience (Rn is natural resilience; Rtr is resilience which a person has acquired by experience and training).

After training for resilience the person becomes less sensitive (Sen cur < Sen N). Thus, it is possible to assume that for a person: Sen N + Rn = Sen cur + Rcur = constant. Hence, resilience replaces sensitivity (see figure 26).

But sensitivity is a natural ability to feel danger, avoid it, or prepare for possible danger. The person with high resilience can endure stronger stress, starts to worry about danger later than the person with low resilience, and can come closer to the danger point/zone. In other words, a human system is capable of deviating from a stable state and the ability to maintain balance within the environment (Volkenstein 1988, 505-08).

The process of changing sensitivity and resilience may have a nonlinear character at the edges of a life cycle. For example, old and young people have different life experiences, but both are very sensitive and quite similar in their behavior. Children maintain a balance naturally or automatically. Their feedback is immediate. If something goes wrong, they will cry or laugh. They have not yet developed adults‘ rules of behavior in their mind. Old people might lose their resilience which still maintains their life, but an organism, such as a biophysical system, cannot recover anymore.

Thus, the explanation above about the influence of environment (Lstr) and resilience to this (Rstr) might persuade a commander to develop resilience selectively and lead subordinates effectively in a combat environment. Recognition of limitations in

resilience training helps the military to avoid crossing a boundary which separates them from the civilian community or civilian —comfort zone." It facilitates their successful cooperation with a local population under conditions of irregular warfare and provides better adaptation for civilian life after retirement.

Placement of personnel

It is important to assign a right job for a subordinate in a DE. This part of chapter 4 will focus on the placement of personnel on the basis of satisfaction which plays one of the key roles in leadership. A lot of theories and research studies highlight this subject. Satisfaction can increase a unit's effectiveness with minimum consumption of resources.

In spite of this, satisfaction in the military is not so important in comparison with civilian organizations. Commanders mostly use motivation to influence the behavior of subordinates and the government recruits people by motivation. Accordingly, military benefits such as free education, medical care, housing, stable salaries, and pensions attract people.

In comparison with most civilian organizations a military unit is more dynamic in regard to its personnel. Therefore, it is important to monitor the placement of personnel and to give the right job to the right person. To give a subordinate a job which he likes doing and is naturally close to his skills and abilities would increase the level of satisfaction and hence performance as well. Moreover, job satisfaction may decrease conflict within a unit and establish a more positive climate.

A commander may lose a lot of energy because of negotiations in order to persuade subordinates to do a job. This happens because the jobs of subordinates are not monitored and analyzed. Even though, if a subordinate is not interested in his position, he

might carry out his job for years. In many armies changing jobs is not so a popular idea in comparison with civilian organizations. It can happen only in a critical situation such as when an officer or NCO has real problems performing a job or decides to retire because the current job position is absolutely not interesting to him and he cannot realize his social needs (Maslov 1970). This is one of the reasons for conflict between subordinates and a commander.

To better use the abilities and skills of subordinates could be one of the key points to sharply increase unit effectiveness without any additional resources. Commanders and subordinates will spend their energy on positive and productive work and will get satisfaction from this work because they have the job which they like doing. Furthermore, "research has also shown that people who are more satisfied with their jobs are more likely to engage in organizational citizenship behaviors–behaviors not directly related to one's job but that are helpful to others at work . . . happier workers tend to be more helpful workers" (Hughes, Ginnett, and Curphy 2006, 244-45).

People either have a strong need or relatively low need for achievement. "McCleland (1975) maintained that differences in achievement orientation were a primary reason people differed in the levels of effort they exerted to accomplish assignments, objectives, or goals" (Hughes, Ginnett, and Curphy 2006, 253). Therefore, a commander has to focus on the subordinates with low levels of achievement motivation tendency as the weakest section in the military unit which defines the unit's effectiveness and performance. To give a right job position might increase the level of achievement motivational tendency. Moreover, the wrong job position may limit the subordinate's ability to fulfill his high level of achievement orientation. As the result, a subordinate

may pursue other activities in order to look for additional responsibilities or opportunities for advancement, or find another job which provides the opportunity to achieve success and rewards for his efforts.

Intrinsic motivation is vitally important to increase a subordinate's effectiveness. "The key for leadership practitioners is to identify the activities their followers like to perform (within reason), and increase their job opportunities to do them" (Hughes, Ginnett, and Curphy 2006, 257). In this case the job could be part of a hobby or vice versa. Simply stated, leaders should ask subordinates what they like to do. Even though a subordinate has the job he could ask for the job that is more appropriate and satisfying for him.

Changing job positions could make leadership more effective. It has many advantages such as the creation of a positive working climate, reinvigorating the employee, decreasing the retirement rate of subordinates, and their work becoming more enthusiastic and creative. All these advantages will improve unit effectiveness.

To give the right job to the right person means getting a maximum result with minimum loses of forces and energy. A commander who places subordinates according to their skills and natural abilities is similar to a mechanic who regulates an engine and makes it more powerful with less gas consumption.

The Myers-Briggs Type Indicator (MBTI) is an assessment which defines personality preferences of reality and decision making. This "theory is that much seemingly chance variation in human behavior in fact is not due to chance; it is the logical result of the basic, observable preferences" (Myers et al. 2003, 21).

It is a good idea to build a team according to the psychological assessment of subordinates, but ―the most critical aspects of the MBTI assessment is that it has nothing to do with skill, ability, intelligence or mental health" (Rutledge 2008, 2). Hence, MBTI cannot precisely recommend how to give the right job to the right person. However, there are other assessments that can do this, such as the Campbell Interests and Skill Survey (CISS). As indicated on the Creative Organizational Design's web site it is ―a contemporary survey that measures self-reported interests and skills." But the CISS focuses on job positions that require post-secondary education for people with college or university education.

The approach with the minimax criterion is more realistic because it evaluates all categories of the military (a group) in the current situation. This model is universal, simple and practical to use.

Minimax criterion can help find an optimal way to lead subordinates. It is ―a concept in game theory and decision theory which requires that losses or expected losses associated with a variable that can be controlled be minimized" (Lapedes 1978, 630) in order to get maximum probable gain.

The model (figure 27) explains how to find an effective way to use a subordinate (a group) in a dynamic environment. Value indicators determine the most effective way (W).

a, b, c, d–value indicators or coefficient of personal (group) effectiveness during a certain time and in the certain role. Some possible job positions include: a1, a2; b1, b2, b3 and so on. For example in figure 27, if for the subordinate a2 > a1, b3> (b1 or b2), c3 > (c1, c2, or c4), and d1 > (d2 or d3) the best way to use him/her is: W = a2 - b3- c3 - d1.

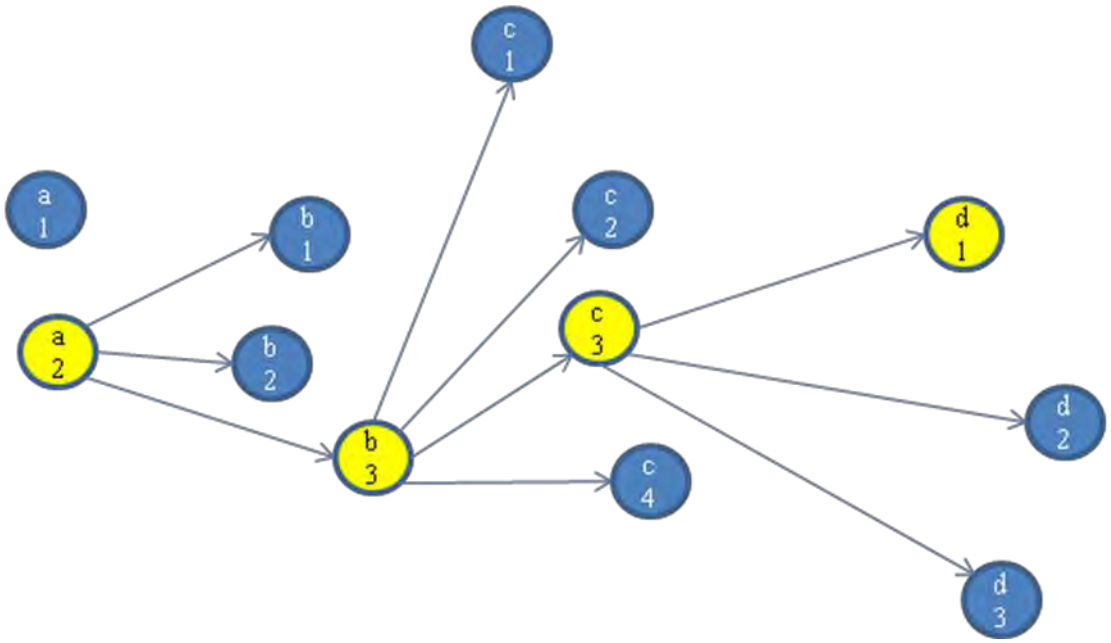

Figure 27. The most effective way to use a subordinate

Source: Created by author.

$$a(b,c,d) = \frac{E}{Pr} \times 100\% \qquad (11)$$

E - personal (group) effectiveness; Pr - the price of the result.

$$E = \frac{Rs}{Tm} \times 100\% \qquad (12)$$

Rs–Result (performance); Tm–time coefficient (how quickly the task was accomplished).

Pr = P (required level of persuasion) + Cr (level of control) + Mn (money, salary) + Tch (teaching of a person).

$$Pr = P + Cr + Mn + Tch \qquad (13)$$

P–Persuasion–we lose a lot of energy to persuade somebody to do something;

Cr–Control–time and energy which commander spends to control the person;

Mn–Money - with job satisfaction, subordinates require less money in order to attract them to do the job;

Tch–how much time and energy have been spent teaching the subordinate. In many cases the subordinate couldn‘t be adapted naturally for a certain kind of job, and to teach just a little skill requires a lot of time.

a(max) = E/Pr(min). This means that —å will be max when Pr is min. Thus, the coefficient of effectiveness (a, b, c, d and so on) shows how the job position corresponds to the person.

Personal effectiveness (E) is different for each subordinate and depends on a number of factors. But in the military unit it has to be the person which is the most suitable for a certain task and can do the job better than anyone else. The commander has to identify this person.

Obtaining maximum results for a minimum price is the goal in finding the right job for the right person with abilities and skills that are natural or obtained from experience and education. The commander‘s role is to monitor the situation and direct subordinates on the most effective way. At any moment the commander can change a subordinate‘s job position and give him another task, and the person can stay at his job as long as he is the most effective.

The W (way) might be used for a person approximately on the similar levels or with a gap like +2, - 1 level. It might be a flexible and universal position. Theoretically every officer has the same military knowledge and skills from a military college and can carry out duties at the appropriate levels. For example, a captain can lead like a captain,

major, lieutenant colonel (in emergency) or 1st lieutenant also (but again, only in an emergency). This does not mean that a 1st lieutenant will carry out a duty of lieutenant colonel. A platoon leader can be a better teacher than a company commander. During field training it is possible to use a professional sergeant instead of a platoon leader. At this time a platoon leader can be on the more important duty or in his place could be a company commander.

A commander has to monitor the dynamic situation and change subordinates‘ positions in order to for them to reach their full potential and effectiveness. Furthermore, changing duties for subordinates provides conditions in which everyone can replace everyone else. This is extremely important in combat environment. Multifunctional and universal subordinates reinforce unity, mutual understanding and unit effectiveness.

Summary

Chapter 4 introduced the improved method of leading subordinates in a DE which explains when and why a commander should change his/her leader‘s power, leadership style and changing unit structure. This method provides high unit effectiveness in any operational environment. There are recommendations about personal resilience with limitations in its training. The proposed model for placement of personnel makes a military unit more effective and survivable.

CAPTER 5

CONCLUSION AND RECOMMENDATIONS

Introduction

The purpose of the research was to find an improved leadership model that would significantly increase unit effectiveness in a DE. Maintaining and increasing unit effectiveness was the research issue.

Chapter 5 is organized according to the research context.

The result of the research is a leadership mathematical model, as a universal method of leading subordinates in a DE (figure 13), and recommendations about training for personal resilience and a model for placement of personnel.

The research findings

A DE requires quick responses from a military unit. In these conditions leadership is complicated with a low probability of correct decisions in comparison with a stable situation. The method of leading subordinates in a DE makes leadership more understandable and predictable. The research answered when a commander should change his/her leader‘s power, leadership style or a unit‘s structure and why he has to bring about these changes.

Equilibrium of a military unit with its environment provides unit stability and, hence, high effectiveness. The method of leading subordinates in a DE directs a commander to use correctly a leader‘s power, leadership style and vision in order to maintain unit effectiveness.

This corresponds to the current transitional phase of the Ukrainian Army. The leadership mathematical model presented here helps commanders to lead subordinates effectively, create the right vision, and change the organizational structure, which is critical during a transitional phase.

The process of leading subordinates in a DE has not been researched widely. Leadership theories, methods and recommendations to lead subordinates have mostly been set in stationary conditions with fixed characteristics. This proposed leadership mathematical model of leading subordinates in a DE enriches leadership as a science.

Two main approaches permitted conducting the qualitative research: (1) comparison of a military unit with a human biophysical system; and (2) analyzing personal behavior in a DE. The first approach allowed explaining different processes in a military unit and identifying critical characteristics of personal behavior. The second approach gave the opportunity for the author to find a method of leading subordinates in a DE. Both of them helped to determine the important characteristics of a military unit on the basis of an analytical view and with mathematical interpretations of the problem. The combination of all the means above allowed making assumptions which have been proven on the basis of leadership theories, knowledge of biophysics and mathematics.

Thus, the determined unit characteristics can evaluate a military unit and define for a commander why and when he/she has to change leadership means. The question "why" to change leadership is more philosophical and has a direct connection with an old military culture. For a commander to change leadership style is the commander‘s real problem. Changing a personal leadership style has not been a popular idea, even though it is one of the key points in maintaining unit effectiveness under increasing stress.

A commander evaluates a situation with his/her situational awareness and situational understanding and determines the suitable leadership means according to the proposed algorithm (figure 13). The mathematical description of this method provides an opportunity to assess the military unit before the mission and analyze how a commander, subordinates and a military unit as a whole will be effective in certain situations. Also this assessment gives an opportunity to prepare a military unit for future challenges.

The method of leading subordinates with the algorithm and mathematical formulas defines points in time when to change leadership power, styles and organizational structure. Thus, a commander‘s flexibility, adaptability and versatility with leadership tools maintain or increase unit effectiveness. Furthermore, a change in a unit‘s structure through the commander‘s vision allows winning the operational campaign and saving a military unit from destruction. The algorithm (figure 13) assesses the probability of enduring stress (combat situation) for a military unit with certain characteristics, organizational structure, and a certain type of commander. It prevents the deployment of an unprepared military unit and permits selection of the right commander and subordinates for a certain kind of operational environment.

The method logically explains why a commander has to change his/her leader‘s power, leadership styles, and unit structure. Also, the mathematical approach can predict unit effectiveness in different conditions in advance before the mission.

This research determined three points when a commander has to change his/her leadership means. In order to maintain unit effectiveness at point (1) a commander should start changing his/her leader‘s power and keep one leadership style; at point (2)–change leadership style; and at point (3)–change the unit‘s structure. The proposed algorithm

(figure 13) with formulas defines these points. Every organization has these three key points which define the process of leading subordinates. This process is endless, so the new higher level with the next unit‘s structure will have three similar points (see figure 14). Unit established characteristics, such as Csu, Ei, Fs, Fc, f(y), f(x) and others, make the algorithm universal and functional for any organization, including a battalion or a brigade.

Proposed personal characteristics such as Cps and Cfl can assess a commander and subordinates as well. Cps defines personal ability to remain effective under growing stress and Cfl defines personal flexibility that is vital in leading subordinates in a DE.

In addition, the research highlights the primary role of communication and what the commander‘s focus has to be. The research proposes some recommendations such as creating a mental line with teams in order to implement the commander‘s vision in order to maintain a military unit functional and able to change the unit‘s structure at point (3).

The biophysical approach provided conditions to define critical points such as Lstro and Rstro (see figure 2) when the human system starts losing stability. These points and bifurcation points, where a unit‘s structure has to be changed, create a frame of organizational effectiveness which is measured by these points.

Analysis of personal resilience under stress directs commanders to train subordinates‘ resilience correctly and selectively in order to avoid post-traumatic syndrome, which is difficult to treat. Moreover, retuning to a previous ―comfort zone” could be impossible and a soldier who crossed the Rstro (see figure 2) and come down with this syndrome because of strong stress (Lstro) would consider self-destruction and would not be able to cope in civilian life.

The model for placement of personal into job positions (figure 27) focuses on job satisfaction with a maximum use of subordinates‘ natural abilities, skills, and experience. The model for placement of personnel could develop into a new kind of relationship between a commander and subordinates when they view each other as equal partners.

The approach with minimax criterion creates a method to evaluate people in their current situation according to not only their knowledge and experience, but also their mood, wishes and interest in the current job position. This method which is simple, realistic and practical in use allows getting maximum effectiveness from subordinates and sharply increasing unit effectiveness without any additional resources. Also, it provides the opportunity to create multifunctional subordinates who can replace each other if needed.

The research explains the limits of power which is important in the process of leading subordinates effectively in a DE, because to do this requires using different influence tactics of power and leadership styles.

Recommendations

For further study: to find or choose a suitable methodology and scale to determine characteristics such as sensitivity, resilience, level of emotional intelligence and influence of environment.

For action: use this method in leadership as a commander‘s tool and in the process of analyzing a military unit.

Summary

This research has been the author‘s attempt to describe leadership in a DE with a mathematical approach. The method of leading subordinates in a DE may be used for any organizational level and in any situation. A commander with knowledge of this method, as a practical leadership tool, can maintain unit effectiveness, create the right vision and achieve needed structural change successfully in the future. It makes the leadership process predictable and therefore valid. The method proves that leadership as a science has a mathematical interpretation. It gives a commander the opportunity to analyze human behavior and always makes a military unit effective.

Immense human accent in different combinations makes leadership colorful, amazing and enjoyable to study. As many leadership approaches exist as there are people. To find the best approach for subordinates is a commander‘s art and science, which have to provide high unit effectiveness.

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